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THE GIRAFFE.

THE
ZOOLOGICAL MAGAZINE,
OR
JOURNAL OF NATURAL HISTORY.

THE GIRAFFE, (*Camelopardalis Giraffa*, GMEL.)

THE history of the Giraffe affords one of the most striking examples of the slow and uncertain progress of Natural History, and strongly points out the necessity of unwearied research and repeated observation to ensure its advancement. Indeed it appears scarcely credible that the quadruped which exceeds every other in its lofty stature, which bears so remote a resemblance to any in its extraordinary proportions, and is equalled by so few in the beauty of its colouring, should have remained till within sixty years of the present time so obscurely known as to have had its very existence cast into doubt. But the descriptions of this animal which appeared in the middle ages having been overlooked, the more ancient notices, vague and imperfect as they in general were, while they seemed to ascribe to the camelopardalis a combination of the characteristics of a ferocious beast of prey with those of the harmless ruminant, began at length to be regarded with the same degree of distrust as the fabulous narratives of the unicorn and sphinx.

In the year 1770, after three centuries and a half had elapsed without any example of the giraffe, dead or alive, having appeared in Europe, this impression seems to have become so general, that the Royal Society thought it proper to publish in their Transactions the simple recital of a traveller who had himself seen and procured a representation of the living giraffe. Capt. Carteret, in his communication to that learned body, says, "Inclosed I have sent you the drawing of a camelopardalis, as it was taken off from the life, of one near the Cape of Good Hope. I shall not attempt here to give you any particular description of this scarce and curious animal, as it is much better known to you than it can be to me; but from its scarcity, as I believe none have been seen in Europe since Julius Cæsar's time (when I think there

were two of them at Rome), I imagine its drawing, and a more certain knowledge of its reality, will not be disagreeable to you. As the existence of this fine animal has been doubted by many, if you think it may afford any pleasure to the curious, you will make what use of it you please." He goes on to say, that a party of men sent by the Governor of the Cape of Good Hope on an inland discovery, found two of these creatures; but they caught only the young one, from which the drawing was taken, and the skin of which was sent to Holland "as a confirmation of the fact.*"

Ten years after this announcement of the actual existence of the giraffe, the skin of a fine male specimen was brought to this country by Lieut. Paterson, by whom it had been shot in the interior of Caffraria. This skin was presented to the celebrated John Hunter, and still forms part of his collection preserved at the Royal College of Surgeons†. It was the first example of the remains of the camelopardalis ever brought into England, and excited the greatest interest at the time. Since that period, however, fresh specimens have been rapidly added to the different European collections of Natural History, the results of exploratory journeys in the interior of Africa effected by modern zeal and enterprise; but it was only within a very few years that the habits and gait of this extraordinary species could in modern Europe be again contemplated in the living animal.

The Pasha of Egypt having learnt that the Arabs of the province of Sennaar in Nubia had succeeded in bringing up two young giraffes with camel's milk, caused them to be brought to Cairo; and after resting for three months in his gardens, to prepare them for a journey of greater difficulty and hazard, they were embarked in boats and conveyed down the Nile to Alexandria, where they were consigned to the English and French consuls, as presents from the Pasha to their respective sovereigns.

These young giraffes were both females; but as there was some difference in their size, the consuls of each nation drew lots for them, when the shortest and weakest fell to the lot of England. The giraffe‡ destined for our sovereign was conveyed to Malta under the charge of two Arabs, and was from thence forwarded to London in a merchant vessel, and arrived on the 11th of August 1827. The animal was conveyed to Windsor two days after in a spacious caravan, and was lodged

* Phil. Trans. vol. Ix.

† Paterson's Travels in Africa, p. 127.

‡ A minute and interesting account of the arrival and conveyance of this giraffe may be found in the Literary Gazette, August 23rd, 1827.

in a commodious hut, with the range of a spacious paddock, in the late king's private menagerie at Sandpit Gate. Shortly after its arrival at this place it was accurately measured; and its dimensions were found to be—

	Feet.	In.
From the top of the head to the bottom of the hoof . . .	10	8
From the top of the head to the root of the neck	4	0
Length of the back	3	1
From the croup to the bottom of the hoof	2	9
Length of the head	1	9

It was at that time exceedingly playful; but as its growth proceeded, which was rapid (having increased eighteen inches in less than two years), it became much less active; its health evidently declined; its legs almost lost their power of supporting the body; the joints seemed to *shoot over*; and at length the weakness increased to such a degree, that it became necessary to have a pulley constructed, which, being suspended from the ceiling of the animal's hovel, was fastened round its body, for the purpose of raising it on its legs without any exertion on its own part. From the harmless disposition and uniform gentleness of this animal, the interest which it had excited in His late Majesty was very great; but notwithstanding every attention, it died in the following year. Its food was barley, oats, split beans, and ash leaves. It was never observed to drink any other fluid than milk, its preference for which probably arose from that fluid being so long the only sustenance afforded it while living among the Arabs.

Owing to the distance from town at which this animal was kept, and the state of confinement which its weakly condition rendered indispensable during the latter period of its existence, the living giraffe was seen in this country by comparatively few individuals. The skin, however, and skeleton, both beautifully prepared, are preserved in the Museum of the Zoological Society,—the munificent donations of His present Majesty.

The full-grown male giraffe is reported to be sometimes nearly twenty feet high, from the summit of the head to the sole of the foot. The highest specimen, however, in the British Museum, (which is a beautiful male brought over by Mr. Burchell,) measures seventeen feet six inches; the remainder do not exceed sixteen feet. The greatest peculiarity in this animal, and what most strikes the eye of the observer, is the remarkable disproportion of the different parts of its frame. The head and the trunk are of extreme shortness, especially when compared with the neck and legs, which are

as disproportionately elongated. The trunk, for example, is divided into three equal parts, the fore and hind quarters having respectively the same length as the intermediate division,—a circumstance which occurs in no other quadruped. To this curtailed trunk are attached legs of extreme length, which, if they were of the ordinary proportions, would have rendered the giraffe the swiftest of animals: but the contrary is, in some measure, the result; for while the fore and hind pair of legs are too closely approximated, they are also of unequal length, and this inequality is so disposed as to retard swiftness of motion. The hare and the greyhound have the hinder legs the longest; and, as these are the principal propellers in locomotion, hence results the peculiar and proverbial swiftness of these quadrupeds; but in the giraffe, the proportions of the extremities are reversed, and, consequently, when compelled to flight, although from his superior stature he can, for a short distance, outstrip his pursuers, yet he soon grows weary, and becomes incapable of sustaining a prolonged chase.

From the time of Heliodorus bishop of Tricca, to the present day, the peculiar gait of the giraffe has been noticed, and is described by most authors as a sort of natural amble. That ancient writer, in his work entitled *Ethiopica*, written in the fourth century of the Christian æra, observes: "The ambassadors of the Axeomitæ (Abyssinians) brought presents to Hydaspes; and among other things, there was an animal of a strange and wonderful species, about the size of a camel, which had its skin marked with florid spots; the hinder parts, from the loins, were low, like those of a lion; but the shoulders, fore-feet, and breast, were elevated above proportion to the other parts; the neck was small, and lengthened out from its large body like that of a swan; the head, in form, resembled a camel's, but was in size about twice that of a Libyan ostrich; and it rolled the eyes, which had a film over them, very frightfully. It differed in gait from every other animal, terrestrial or aquatic, and waddled in a remarkable manner; each leg was not moved alternately and diagonally, but those on the right side moved together independently of the other, and those on the left side in the same manner, so that each side was alternately elevated. This animal was so tractable as to be led by a small string fastened to the head, and the keeper could conduct it wherever he pleased, as if by the strongest chain." Similar testimony respecting the gait of the giraffe is given by Antonio Constanzio, an Italian author, who describes the giraffe presented to Lorenzo de Medici by the Soldan of Egypt, and

which was living at Florence in the year 1486. "It is," says he, "in the meridional part of Ethiopia that the camelopardalis, which the Arabs call *Siraf*, is found. Its hinder part is so low compared to the front, that it seems as if it were sitting. The inhabitants of Florence have seen this giraffe, without any effort, to run with so much speed as to outstrip the cavaliers, even when they gave the rein and spur to their steeds." In another place he adds, "What is very surprising, is, that Pliny, Solin, Strabo, Albertus Magnus, Diodorus, Varro, and other writers, were ignorant that this animal had horns; which leads me to conjecture that the one which was seen for the first time at Rome under the dictatorship of Julius Cæsar, had lost its horns, as well as the one which appertained to the Emperor Frederic in the time of Albertus Magnus." Lastly, Constanzio observes: "When the camelopardalis walks, the left foot does not follow the right fore-foot; on the contrary, the two right feet move together, then the two left."

It has, however, been denied that the giraffe exhibits this ambling gait. Mr. Davis the animal painter, who executed several portraits of the living giraffe for His late Majesty, observes: "I doubt whether the giraffe does amble, as asserted by M. Geoffroy St. Hilaire. Its walk is fast, from the length of its limbs, but extremely awkward; its gallop is a succession of jumps, and I see no reason why it should not continue long, if we judge by analogy with the form of some horses and dogs that have narrow stomachs: there may be a sufficient space for the play of lungs in depth, if not possessed in breadth. When I say the walk is awkward, perhaps this specimen is hardly a fair one to form such an opinion generally, for its growth has been very rapid, and its limbs are deformed by the treatment it experienced when in the hands of the Arabs in its overland journey from Sennaar to Cairo. It was occasionally confined on the back of a camel; and when they huddled it together for that purpose, they were not nice in the choice of cords, or the mode of applying them; it bears the marks of what it must have suffered in this way.**"

Our own observations on the giraffe now living in the Garden of Plants in Paris, which exhibits none of the untoward symptoms mentioned by Mr. Davis, go very much to support the ancient and generally received opinions on this subject. In starting, we observed that it invariably moved first a fore-foot, then the hind-foot of the opposite side; this action was almost immediately followed by throwing forward the fore-foot of the same side; then the hind-foot of the opposite side

moved, and was as quickly succeeded by the carrying forward of the leg which had commenced the movement; the gait then proceeded, the two legs of the same side appearing to move simultaneously, although not exactly so; for on a close inspection, a trifling interval could be detected between the elevation of the fore- and hind-leg of the same side. Whenever it commenced its walk, its long neck was stretched forward in a line with his body, so as to give it rather a stiff and ungainly appearance; but the novelty and uncommon peculiarity of every movement and act of this animal overpowered every sentiment but that of astonishment and of delight.

The chief beauty in the giraffe is the form of the head, and the lustre combined with a mild expression of the eye. These organs are large and prominent, and are so situated at the side of the head, that the animal can see both behind and below it without turning its head. Hence, while browsing on the acacias which skirt the desert, he can command the space behind without suspending the act of feeding. The ears, as in all the ruminants, are well formed for catching sounds; they most resemble those of the ox. The nostrils have the same shape and position as in the camel, the upper lip being hairy and extending considerably beyond them. The sense of smell is acute and delicate. The most remarkable of the organs of sense is the tongue, which is so modified as to perform in the giraffe many of the purposes for which the proboscis of the elephant is destined. It is even in some respects superior to that wonderful organ; for being composed almost wholly of contractile parts, unmixed with rigid ligamentous and cartilaginous material, it can be wholly retracted within the mouth, although when fully extended its length is seventeen inches. When in the latter state, it is so attenuated that its extremity can be inserted into the ring of a very small key; it resembles, in short, a large black worm twisting about the animal's lips, and in this state it is used to hook down the branches which would otherwise be out of the reach of even the Giraffe's lofty stature. We have observed the giraffe in the Garden of Plants instinctively performing this action in extracting the highest straws from the partition which separated it from a neighbouring stall. With respect to the peculiar colour of this organ, Sir Everard Home observes: "As the tongue, in procuring and tasting the food, is much exposed to the sun's rays, it is furnished with a black rete mucosum, to prevent its being blistered.*" It is covered with little papillæ, which Mr. Davis † remarks it can raise at pleasure; for at times the tongue is perfectly smooth and soft,

* Phil. Trans. vol. cxviii.

† Literary Gazette, Dec. 1, 1827.

at others exceedingly rough. The lips possess great flexibility, the upper one being longer than the lower, and rather pointed at the end, and therefore adapted to assist the tongue in drawing in boughs, but when grinding the food it is contracted.

As in all other ruminants, the front or incisive teeth are wanting in the upper jaw. The giraffe lies down when it chews the cud ; and with respect to this action, Sir Everard Home observes that "it is curious to see the cud rise gradually through the length of the oesophagus to the mouth." This gradual motion might probably result from the weak state of the animal he observed ; for in the healthy specimen at Paris, it was still more wonderful to watch the rapidity with which the cud traversed the long neck to reach the mouth ; the eye could hardly follow it in its passage.

It would seem, from the silence of the early describers of the giraffe, that the horns were either occasionally deficient, or, from their small size and peculiar covering, had been overlooked. The latter is the more probable supposition, for in none of the instances, in which this animal has come under observation since the importance of careful scrutiny in Natural History has been duly appreciated, have the horns been found wanting. In the female giraffe now living at the Garden of Plants, they are seven inches in length, perfectly conical for one half of their extent, whilst the other half, which is cylindrical, is curved backwards, and ends obtusely. Each horn is eleven inches in circumference at the base, four inches in circumference at the middle, and the same at the extremity. The skin of the head covers them entirely, and the hair is of the same length there as on other parts, except at the extremity of the horn, where the hairs are longer, and hang off like a tuft or brush.

In order to understand completely the nature of these horns, it becomes necessary to consider those of ruminating animals in general. The weapons with which these otherwise defenceless animals are provided, are situated on the upper part of the head, and are wielded with a vigour proportionate to the vast muscular apparatus connected with that part. They are of two kinds. In the ox, the sheep, the goat, and the antelope, the horns are composed of a true elastic horny sheath, encased upon a bony core, which is a production or branch of the frontal bone of the skull. These two parts grow together ; they are never shed. After death the outer sheath separates, sooner or later, from its bony core ; its cavity early suggested its utility as a drinking-vessel, &c.,—and in Natural History all this class of horns are technically

termed 'hollow'. In the elk and the stag, on the contrary, the horns consist of bone only*—of a core without a sheath, and are termed 'solid.' The nutrient vessels, which lie safely protected beneath their covering in the preceding examples, could not carry on their functions under the present form: the horn, therefore, soon falls after it is completed, and provision is made for its immediate renewal.

Whilst the growth of the stag's horn proceeds, the vessels which carry and deposit the bony material are protected by an integument covered with short hairs, and termed technically the *velvet*: this outer covering is co-extended with the horn. Were the horns destined, as apparently in the giraffe, to be mere ornaments, they might have retained their hairy investment, and have become permanent; but, being formed for purposes of defence and combat, the nutrient vessels are compressed between tubercles of bone thrown out at the base of the antlers, forming the *burr*; their growth is thus arrested, the integument covering them shrivels and peels off, and they remain naked and insensible weapons. But being thus cut off from any vital connexion with the part from which they grew, the antlers, after a short period, are cast off by a process of absorption set up at their base, in accordance with an universal law, by which dead parts are separated from living.

Now it is obvious that the giraffe differs from both the preceding groups of ruminants in the nature of its horns; for, to say nothing of the female possessing them as well as the male,—a circumstance which rarely occurs in the *solid-horned* ruminants,—they differ also from those of the latter tribe, in being permanent, and in retaining their investment, which is the cause of their permanency. In the nature of this investment, the horns of the giraffe differ essentially from the *hollow horns*, as well as in their bony nucleus, which is not an immediate production from the skull, but is a distinct bone articulated to the former by an expanded base. Of the two tribes, however, it is obvious that the giraffe, in this respect, most resembles the solid-horned ruminants or deer; and the analogy is almost complete, if we compare its horns with those of a red deer in the second year, while in the growing state, or in the *velvet*. This condition, however, which is transitory in the stag, is permanent in the giraffe; and hence we have one of those anomalous genera standing alone and isolated, and partaking more or less remotely of the characters which are found to separate into

* The term 'horns' is therefore obviously improper. The French, who appear to have early appreciated the difference, call the stag's horns '*bois*', in contradistinction to those of the ox, termed '*cornes*'.

distinct groups the animals most resembling it in general structure.

But there remains another peculiarity more remarkable and unexpected than any that have previously been alluded to in this anomalous animal ;—it is a third horn, situated on the median line of the head, between the other horns and the nostrils. It has precisely the same structure as the other horns, and differs only in form and relative size, being more widely extended at the base, with considerably less elevation, so that externally it is only recognised as a protuberance on the part of the head above mentioned.

The head of the giraffe thus ornamented, is supported on an extremely long neck, which is compressed and thin near its junction with the head. This very long neck contains, however, according to Sir Everard Home, (to whom we are indebted for all the anatomical knowledge we possess respecting the giraffe,) but seven vertebrae, the same number as is found in man. From their form and mode of articulation, they however permit every necessary degree of flexibility, and the motions of this part are almost as free and graceful as those exhibited by the swan.

The skin upon the neck, the trunk, the thighs, and part of the fore-legs, is marked with large spots of a reddish or clear yellow hue, upon a dull white ground. These spots, being very close together, present an angular form, more or less approaching to a rhomboid : they are arranged with some degree of regularity, something like the squares of a chess-board. This animal has a mane like the ass or mule, which extends from the back of the head to the withers, composed of short and very stiff hairs. This mane and the ears are of a yellow colour. The under part of the body, with the insides of the thighs and extremities of the legs, are a faded white. The hoofs are black, well divided, and well placed ; they are reduced to a very little thickness behind. The giraffe has generally been described as having, like the camel, a callosity between the fore-legs, supposed to result from a similar manner of resting on the chest when lying down : but Mr. Davis observes, “There are between the fore-legs what, to the casual observer, may appear such ; but these are folds of loose skin, which enable it to separate its fore-legs when reaching downwards. Its mode of resting is, like most quadrupeds, on its side ; but the operation of lying down is curious and peculiar : I will endeavour to describe it.—We will suppose it to be preparing to lie on the off-side : the first action is to drop on the fetlock of the off fore-leg, then on the knee of the near one, to bring down the other knee : it then collects

its hind-legs to perform the next movement, the near one being brought rather forward but wide, until the off hind-leg is advanced between the fore ones ; this requires some time to accomplish, during which it is poised with the weight of its head and neck, until it feels that its legs are quite clear and well arranged ; it then throws itself on its side and is at ease. When it sleeps, it bends its head back, and rests the head on the hind quarter." Besides the loose folds of skin in the situation above described, there are others at the first joints of the fore-legs, which, like pockets or bags, receive the projecting part of the bone termed *ulna*, when the joint falls back during progressive motion, but are quite empty when the animal is at rest. In a preceding part of our description, we have alluded to the apparent disproportion in the length of the fore- and hind-legs. This appearance is, however, in a great measure deceptive ; for, when the extremities themselves are attentively examined, especially when seen in the skeleton, they are found to be of nearly the same length. The sinking of the hind quarter is then seen to depend partly on the greater angle at the bending of the thigh upon the body, but chiefly on the great depth of the chest, together with the great elevation of the spines of the vertebræ at that part, for the purpose of giving a firm and extensive attachment to the strong elastic ligament which supports the neck and head. The tail of the giraffe reaches below the hocks, and is terminated by a long tuft of coarse hairs.

With respect to the habits of the giraffe in a state of nature, our knowledge is confessedly vague and general. The Arabs who accompanied the two young females from which the preceding description has been drawn, asserted that they were taken at a distance of eight or ten days' journey of the caravans, to the south of Sennaar, not far from a district which was mountainous, and covered with deep and extensive forests. It may be presumed, that this country is near to where the Nile and its tributary streams begin to leave the mountains of Abyssinia to flow along the plains ; and here the Arabs stated that ostriches, gazelles, antelopes, a small species of lion and panthers abounded, while deeper in the forests, elephants and rhinoceroses were met with. They observed that the giraffes were found in small number, that they inhabited the forests, and rarely appeared on the plain, when they were united in groups of three and four, two old ones, and one or two young ones, but seldom more. They do not fly at the first view of man ; but if he approaches them, they suddenly start off in a gallop or succession of bounds with such speed, that they leave far behind them the swiftest

horses. However, if they happen to be driven fairly into the plain, they are soon run down, being much shorter-winded than the horse: but, when thus fatigued, they make a sudden turn to the right-about, and defend themselves vigorously with their fore-feet, which they fling out with great force: in fact, the Arabs are unable to take the full-grown giraffes alive, and are obliged to kill them on the spot. They eat the flesh; and out of the skin, which is hard and thick, they make long straps, cut from the top of the head to the end of the fore-feet. The old giraffes are asserted by the Arabs to be able to defend themselves successfully by kicks of their fore-feet, against the most redoubtable animal of the desert. The lion, which learns by experience the resources opposed to him by the giraffe, and the futility of pursuit along the plain, prefers waiting near a stream where that animal drinks, or crouches in view of the grove of *Mimosæ*, whose summits afford him a rich pasturage, and by a single bound falls unawares upon his prey, which is thus taken by surprise and unable to put into use its natural means of defence. If, however, the lion in springing from his ambuscade miscalculates his leap, and is unable to fix on the hinder parts of the giraffe, the latter makes head against him, and often renders mortal the first blow, from the violent and rapid flinging out of the fore-legs: should he miss his stroke, however, and the lion succeed in fixing upon him, he becomes defenceless and falls a victim.

The giraffe in a state of captivity, when teased or offended, manifests his natural mode of defence, by striking out with his fore-legs, and sometimes by kicking with the hinder ones like a horse; but he has never been observed to butt, or to make any demonstration with his horns, but on the contrary always keeps his head raised as high as possible when he is disquieted or afraid.

The Arabs assert that the only chance of taking the giraffe alive is while he still suckles, and even then it most frequently happens, that in their struggles to free themselves they break some of their limbs, or dislocate their neck; at other times they refuse all sustenance, pine away, and die. If, however, they chance to be preserved for a few days, they then become tranquil and soon familiar, readily following those who have the care of them, and even horses or camels.

This propensity was manifested in a singular manner by the giraffe at present living in Paris. After its disembarkation at Marseilles, it passed without any sign of fear through the gates of the Lazaretto, and walked tranquilly as far as an ancient gate of the city, where it suddenly stopped, neither attempting to go forward nor to retrace its steps; it mani-

fested also some alarm and inquietude. Its conductors were considerably embarrassed, not knowing how to induce it to continue its course. Just at that time an inhabitant of the town, who had until then preceded it on horseback, returned to them, and proposed to try if it would follow him ; and in fact the giraffe, as soon as it saw the horse of which it had suddenly lost sight as the latter passed through the gate, became again tranquil, and marched behind it, following it closely with the Arabs, who held it with four reins : the horse, however, became uneasy, and its rider could scarce hold it in, as the giraffe from time to time stretched forward its neck and applied its nose to the horse's crupper. In this course the giraffe had to pass through many of the public promenades, and always strove to reach the branches of the trees near which it passed ; without, however, losing sight of the horse it had chosen for its guide, which it followed faithfully to the stable destined for its temporary abode. M. Salze,* who relates the above anecdote, makes the following observations on the same giraffe. "She has great pleasure in being let out of her stable, and when she is permitted to walk in the gardens of the Prefecture in fine weather, which often occurs, she bounds like a young horse, but in a manner quite peculiar and indescribable, raising herself pretty high from the ground, and falling stiff and immovable upon her legs. Sometimes she will start forward in a gallop, and then she drags along the four Arabs who keep hold of her ; and we have seen her, in a moment of gaiety, drag even five strong men. It is with difficulty she brings her mouth on a level with the ground ; in doing so she separates widely her fore-legs, draws in her crupper, sticks her shoulders as it were out of their place, and elongates her neck in a stiff and truly ludicrous manner : in this position one may readily perceive she could take up a branch from the ground, but one cannot conceive that she could drink. When in this position, she seems dislocated or crippled. It appears that she cannot bend her neck easily downwards towards her fore-feet ; but we have seen her often carry her mouth to the crupper and all along the thighs ; the neck then bends easily into a complete circle. If the giraffe cannot reach the ground without difficulty, she possesses on the other hand an extreme facility in reaching the leaves that are far above her ; stretching out her neck, raising her head, and elongating her tongue to seize the branches that are two or three feet beyond her stature. Thus she can browse, without changing her situation, on the branches of trees for a considerable extent. This animal is

* *Annales du Muséum.*

of a sweet disposition, never manifesting the least sentiment of anger or of malice. She distinguishes the Arab who is in the habit of giving her milk and grain, but has not any particular affection for him. She lets every one approach her who comes to see her, but does not like to be touched; and it is only when afraid of something, or when teased too much, that she defends herself by striking out her fore- or hind-legs.

“She often licks the hands and clothes of the Arab who has the care of her. Sometimes she will use the same familiarity with strangers, and frequently she smells at the persons who approach her. She seems fearful, attentive to every noise, but at the same time is not disquieted by any number of persons who may come to see her. When horses have been brought to her, she appears to view them with pleasure, to regard them attentively, to follow them with her eyes as they recede from her, and to seem to have a wish to go after them: but the horses are uneasy at the sight of her; they stamp with their feet, and bound off the moment the rein is slackened. Cows which have seen her for the first time, show no sign of fear.

“Our young giraffe likes the broad daylight, and its stable is lighted with two windows and a large glass door. It is under the same roof with the two cows that supply it with milk, and two antelopes of large size, and is separated from two strong horses only by a boarded partition. It is fat and in good condition. Since its departure from the Lazaretto it has acquired more gaiety and vigour. It has never been heard to utter any sound.

“One may say that the giraffe has nothing elegant or graceful in the detail of its forms; its short body, its high and closely approximated legs, the excessive length of its neck, the declivity of its back, its ill-rounded crupper, and its long and naked tail,—all these things contrast together in a manner which offends the sight: it seems ill put together, ill balanced on its feet; and yet we are seized with astonishment at its aspect, and acknowledge it beautiful without being able to say why,—only, perhaps, because it is extraordinary, and in opposition with all the animals we are acquainted with. It is very remarkable that, after having considered it attentively, we nevertheless can preserve but an uncertain recollection of its carriage and proportions, which is the reason, I think, that one loves, in general, to see it often; and every time we see it, it gives rise to some new remarks.”

The cloven-footed quadrupeds which chew the cud, form a distinct and well-marked group. The sacred historian and lawgiver of the Jews indicates them by their most natural

characters. They were also defined in almost similar terms by Aristotle, who may be called the father of Natural History. In the system of Linnaeus they are termed '*Pecora*,' and form the fifth of his great divisions of the *Mammalia*, or animals that give suck. In the arrangement of Cuvier they are termed '*Ruminantia*,' and constitute his seventh order.

The zoologist divides the ruminating order into three subordinate groups: two of these subdivisions or tribes, founded on the nature of their horns, have been already pointed out; the third embraces the camels and llamas, which are altogether destitute of horns, and defend themselves with their teeth. In zoological strictness we might consider the giraffe as the pattern of a distinct tribe; but from the before-mentioned analogy of his horns to those of the deer, &c. he is ranked in the solid-horned tribe, and with Linnaeus formed a species of the Stag (*Cervus Camelopardalis*). In the modern arrangements the giraffe forms a distinct genus. It has been supposed, that the giraffe which is found in Abyssinia is specifically distinct from the one inhabiting the southern extremity of Africa: a third species or variety without spots, is also supposed to have been seen by Mungo Park in Central Africa.

THE ZOOLOGICAL GARDENS.

So many descriptions of the Zoological Gardens have already been given to the public, that we shall not at present attempt to enter upon this subject; more particularly as we take for granted that most of our readers have had an opportunity of visiting the interesting and valuable collections preserved there. We intend however, occasionally, to notice the proceedings of both institutions, and to report such matter as we think will be interesting.

Amongst the latest additions at the gardens in the Regent's Park, are three rare species of Antelope; two from the Deserts of Northern Africa, called the M'horr Antelope (*Antilope Dama*), and the Cervine Antelope (*Ant. Bubalis*), and a female specimen of a fine species from India, called the Sing-sing Antelope.—There is also a rare species of Bear from South America, the *Ursus ornatus*, or Spectacled Bear, so called from the peculiar broad light-coloured band round each eye. Of this species we think we have seen a fine specimen in Wombwell's collection.—Two living Beavers presented by the Hudson's Bay Company supply the place of those which

died last winter.—A fine male American Elk has also recently arrived.

Such of the animals as require a greater degree of attention during the winter have been removed to a house in Wellington Street, Somers Town, which has been taken as a temporary repository; but notwithstanding the care bestowed upon them, we are sorry to hear of some losses by death since the commencement of the winter.

The animals that are accustomed to cold climates seem invigorated by the change in the weather. The bears now show themselves to great advantage, and our fair readers we have no doubt will notice the improved appearance of the fur of these and the other animals of this species at the present season.

Additional land has been obtained adjoining the gardens. If the accounts which have been circulated as to the terms on which Government made the grant be correct, every friend to science must regret that there should be so little disposition on the part of those connected with this department of the revenue (the Crown lands) to assist in forwarding the objects of the institution.

We are glad to find that the spirited proprietor of the Surrey Gardens is continuing to make great improvements, and is daily adding to the attractions of the place.

ATTACK BY A TIGER.

BISHOP HEBER relates the following affecting account of an attack by a tiger, which was told him by Major Hamilton: "One of his acquaintance who was marching with a body of troops between Gulliakote and Luneewarra, called on a Bheel villager to be his guide through the wood very early one morning. The Bheel remonstrated, observing that it was not the custom of the country to march before day-light, and that it was dangerous to do so. The officer, supposing this to be the mere pretext for laziness, was positive, and threatened him if he did not go on. The man said nothing more, but took his shield and sword, and walked on along the narrow path overhung with long grass and bamboos. The officer followed at the head of his men, and had moved slowly fast asleep on his saddle for about five miles, when he heard a hideous roar, and saw a very large tiger spring past him so close that he almost brushed his horse. The poor Bheel lifted up his sword and shield, but was down in an instant under the

animal's paws, who turned round with him in his mouth, growling like a cat over a mouse, and looked the officer in the face. He did what could be done, and with his men attacked the tiger, whom they wounded so severely that he dropped his prey. But the first blow had done its work effectually, and the poor man's skull was mashed in such a manner as literally to be all in pieces.—The officer told Major Hamilton that from that day forwards this scene was seldom absent from his dreams, and with the least illness or fever he had always a return of the vision of the tiger, with the unfortunate man in his jaws, whom his imprudence had sacrificed.”

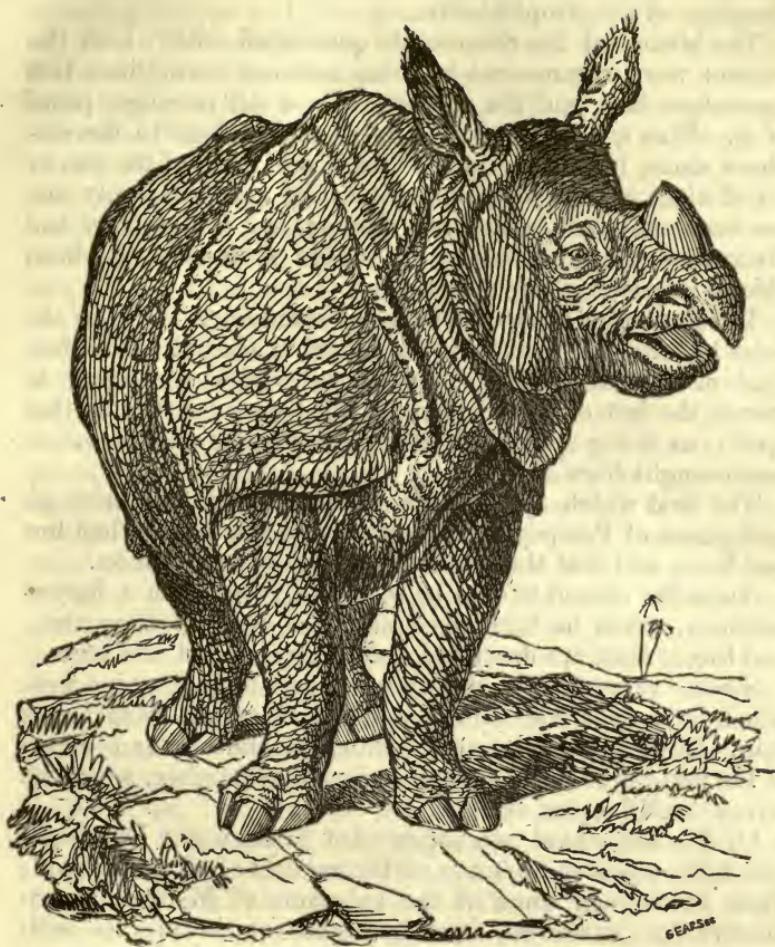
IMPORTATION OF FURS.

OUR fair readers are perhaps not aware of the extent to which they furnish employment to the hunters in North America by their demand for furs. It has been stated that the Hudson Bay Company alone in one year imported 3000 skins of the black bear, 60,000 of the pine marten, 1800 of the fisher (a species of sable), 4600 of the mink, 7300 of the otter, 8000 of the fox, 9000 of the Canadian lynx, 60,000 of the beaver, 150,000 of the musk rat; besides a great many skins of wolves, badgers, and racoons.

SAGACITY OF THE DOG.

MANY years ago, a waterman near Hammersmith was sleeping in his boat, when the vessel broke from her moorings and was carried by the tide under a barge. A dog which was on board awoke the waterman by pawing his face and pulling the collar of his coat at the instant the boat was filling with water, —and thus saved his life.

Le Vaillant, in the course of his travels in Africa, having missed a favourite little dog, directed one of his servants to mount a horse and return in search of the lost pet. After an absence of some hours, the man returned with the dog, bringing with him a basket and a chair that had been dropped from one of the waggons without being noticed. The dog was found at the distance of several miles, lying on the road watching the lost basket and chair; and if he had not been found by the servant, must inevitably either have perished with hunger or been devoured by wild beasts.



THE INDIAN RHINOCEROS, (*Rhinoceros Indicus*, Cuv.)

IF the moderns are able to boast of a more extended knowledge of animated nature than was possessed by the ancients, it must be acknowledged that it is rather the result of their geographical discoveries, than of the zeal of their Governments or commercial Companies for its promotion. And it is humiliating to think that the nations, among which a pure love of science is most widely diffused, still should be debarred the contemplation of those rarer species of quadrupeds inhabiting the Old World, which in ancient Rome were repeatedly exhibited to gratify a tyrant's love of ostentation;

and a people's lust for the cruel combats and wholesale slaughter of the Amphitheatre.

The history of the remarkable quadruped with which the present work commences in some measure exemplifies this anomalous fact, and the rhinoceros is a still stronger proof of it. This quadruped, which is second in bulk to the elephant alone, is peculiar to the Old World ; yet of the five or six distinct species which inhabit Africa and Asia, only one has been exhibited in modern Europe, and that at rare and distant intervals ; while the knowledge of the rest has been chiefly acquired in our own times.

The first rhinoceros of which any mention is made in ancient history, was that which appeared at the celebrated festival of Ptolemæus Philadelphus, and which was made to march the last of all the strange animals exhibited at that epoch, as being apparently the most curious and rare. It was brought from Ethiopia.

The first which appeared in Europe graced the triumph and games of Pompey. Pliny states that this animal had but one horn, and that that number was the most common.

Augustus caused two to be slain, together with a hippopotamus, when he triumphed after the death of Cleopatra : and these, also, are described as having each but one horn.

Strabo very exactly describes a one-horned rhinoceros which he saw at Alexandria, and mentions the folds in its skin. But Pausanias gives a detailed account of the position of the two horns, on a species having that number, which he terms the Ethiopian Bull.

Of this latter kind two appeared at Rome under Domitian, and were engraved on some of the medals of that emperor ; these occasioned some of the epigrams of Martial, which modern commentators, from ignorance of the species with two horns, found so much difficulty in comprehending.

The emperors Antoninus, Heliogabalus, and Gordian, severally exhibited the rhinoceros : and Cosmus expressly speaks of the Ethiopian species as having two horns : there is abundant evidence, therefore, that the ancients possessed a degree of knowledge respecting these animals, of which the moderns were for a long period destitute.

The first rhinoceros which was exhibited in Europe after the revival of literature, was a specimen of the one-horned species. It was sent from India to Emmanuel king of Portugal, in the year 1513. This sovereign made a present of it to the Pope ; but the animal being seized during its passage with a fit of fury, occasioned the loss of the vessel in which it was transported. A second rhinoceros was brought to

England in 1685: a third was exhibited over almost the whole of Europe in 1739; and a fourth, which was a female, in 1741. That exhibited in 1739 was described and figured by Parsons, in the Philosophical Transactions (vol. xlvi. p. 583), who mentioned also that of 1685 and of 1741. A fifth specimen arrived at Versailles in 1771, and it died in 1793 at the age of twenty-five or twenty-six years. The sixth was a very young rhinoceros, which died in this country in the year 1800: some account of its anatomy was published by Mr. Thomas, in the Philosophical Transactions for that year. Lastly, a seventh specimen was living a few years ago in the Garden of Plants at Paris. All these specimens were one-horned, and all from India. So that the two-horned rhinoceros has never been brought alive to modern Europe, and it was long before even an accurate description of it was given by travellers; its existence was known only by specimens of the horns adhering to the skin of the head, which were preserved in different museums. As these specimens were from Africa, and as the first authentic accounts of the living animal of the two-horned species were derived from the histories of African travellers, a general notion prevailed that Asia afforded the one-horned species only, and that the two-horned kind was peculiar to Africa. However, in the year 1793, Mr. William Bell, a surgeon in the service of the East India Company, discovered a species of rhinoceros in the Island of Sumatra, which had also two horns, whose skin, like the African two-horned species, did not exhibit those folds which are so peculiar to the hide of the Indian rhinoceros. This species, however, differed from the African rhinoceros in possessing incisive or front teeth, which in the latter are wholly deficient. The Abyssinian traveller Bruce has given a vague indication of a two-horned rhinoceros, which exhibits the plaiting of the hide peculiar to the Indian species; and some naturalists have supposed it probable, from the form of the horns, that this may ultimately be found to be a true and distinct species. More recently, again, the accurate and scientific traveller Burchell has announced the existence in the interior of the southern promontory of Africa, of a rhinoceros double the size of the ordinary Cape species, which, like it, has also two horns, and a skin without hairs or folds, but which differs in having the lips and nose thickened, enlarged, and as if flattened.

Thus we find that two, if not three, distinct species of two-horned rhinoceros exist in Africa, and that another distinct species, similarly armed, is found in Sumatra. Lastly, we have to add a second species with one horn, discovered by

Sir Stamford Raffles in Java, the smallest of all the living species, and quite distinct from the Indian one-horned rhinoceros.

The characters which these several species possess in common, and which distinguish them from all other quadrupeds, are the following. Both sexes are armed with one or two horns, of an uniform fibrous texture, placed on the nose, and always situated on the middle line of the head. They have three toes on each foot, and each toe is inclosed in a thick rounded hoof. These, therefore, constitute the true generic character of the rhinoceros.

In their large size, bulky body, and thick legs, they resemble the elephant, have a hide even thicker than that animal, and are rendered further peculiar in some of the species by being thrown into deep and extensive folds. The surface of the skin is rough, and devoid of hair: the snout is elongated in some of the species, while in others it is remarkably blunted, and as if cut off: the eyes are very small, like those of the hog: the ears elongated, but much shorter than the head, and supported, as it were, on a sort of pedicle or stalk: the lips project beyond the mouth, and the upper one especially is very moveable: the tail is short, and its extremity bears a number of very stiff and large bristles set on at the sides, and projecting in two opposite directions. The number of nipples are two, and situated on the groin. Some species possess, while others are deficient in, incisive or front teeth; the canine teeth are wanting in all; the grinding or cheek teeth are seven in each jaw on each side.

It is our intention, in succeeding Numbers, to give the most accurate figures and accounts that can be obtained of the several species above indicated. In the present Number the one-horned species of India (*Rhinoceros Indicus*, Cuv.) will be described. As this is the only species which, in modern times, has been brought alive to Europe, it has been most commonly figured. A sketch was taken from the animal sent to Portugal in 1513, which was engraved by Albert Durer. This sketch, as it was improved and embellished by the celebrated painter of Nuremberg, came afterwards into the possession of Sir Hans Sloane; and to it was attached a German inscription, of which the following appears in the Philosophical Transactions for 1744, as 'a close translation.' "In the year 1513, upon the 1. day of May, there was brought to our king at Lisbon such a living beast from the East Indies that is called *Rhinocerate*: therefore, on account of its wonderfulness, I thought myself obliged to send you the representation of it. It hath the colour of a toad,

and is close covered over with thick scales. It is in size like an elephant, but lower, and is the elephant's deadly enemy : it hath on the fore-part of its nose a strong sharp horn ; and when this beast comes near the elephant to fight with him, he always first whets his horn upon the stones, and runs at the elephant with his head between his fore-legs ; then rips up the elephant where he hath the thinnest skin, and so gores him. The elephant is terribly affraid of the *Rhinocerate*, for he gores him always wherever he meets an elephant, for he is well armed, and is very alert and nimble. This beast is called *Rhinocero* in Greek and Latin, but in Indian, *Gomda*."

The animal which was sent to England in 1739, is described by Dr. Parsons as being "very broad and thick. His head, in proportion, is very large, having the hinder part next his ears extremely high in proportion to the rest of his face, which is flat, and sinks down suddenly forward towards the middle, rising again to the horn, but in a lesser degree. The horn stands on the nose of the animal as upon a hill. I have seen the bones of the head of one of these in Sir Hans Sloane's museum ; and the part on which the horn is fixed rises into a blunt cone, to answer to the cavity in the basis of the horn, which is very hard and solid, having no manner of hollow or core like those of other quadrupeds. That part that reaches from the fore part of the horn towards the upper lip may be called the nose, being very bulky, and having a kind of circular sweep downwards towards the nostrils : on all this part he has a great number of wrinkles running cross the front of it, and advancing on each side towards his eyes. The nostrils are situated very low, in the same direction with the opening of the mouth, and not above an inch from it. His under lip is like that of an ox, but the upper more like that of the horse, using it, as that creature does, to gather the hay from the rack, or grass from the ground ; with this difference, that the rhinoceros has a power of stretching it out above six inches to a point, and doubling it round a stick or one's finger, holding it fast ; so that as to that action, it is not unlike the proboscis of an elephant.

" As to the tongue of the rhinoceros, although it is confidently reported by authors that it is so rough as to be capable of rubbing a man's flesh from his bones, yet that of our present animal is soft, and as smooth as that of a calf ; whether it may grow more rough as the beast grows older, we cannot say.

" His eyes are dull and sleepy, much like those of a hog in shape, and situated nearer the nose than that of any other

quadruped I have ever seen, which he very seldom opens entirely. His ears are broad and thin towards the tops, much like those of a hog, but have each a narrow round root with wrinkles about it. His neck is very short, being that part which lies between the back edge of the jaw and the fold of the shoulder: on this part there are two distinct folds which go quite round it, only the fore-one is broken underneath, and has a hollow flap hanging from it, so deep, that it would contain a man's fist. From the middle of the hinder of these folds arises another, which, passing backwards along the neck, is lost before it reaches that which surrounds the fore-part of the body.

“His shoulders are very thick and heavy, and have each another fold downward that crosses the fore-leg, and almost meeting that of the fore-part of the body just mentioned; they both double under the belly close behind the fore-leg.

“His body in general is very thick, and juts out at the sides like that of a cow with calf. His belly hangs low, being not far from the ground, as it sinks much in the middle. From the highest point in his back, the fold of the loins runs down on each side between the last ribs and the hips, and is lost before it comes to the belly; but above the place of its being lost, another rises and runs backward, round the hind legs, a little above the joint: this I call the crural fold, which runs up behind till it meets another transverse one which runs from the side of the tail forward, and is lost before it reaches within two inches of that of the loins.

“The legs of the rhinoceros are thick and strong; those before, when he stands firm, bend back at the knee a great way from a straight line, being very round and somewhat taper downwards. The hinder legs are also very strong, bending backwards at the joint at an obtuse angle, beneath which the limb grows smaller, and then becomes gradually thicker as it approaches the foot; so also does that part of the leg. About the joint of each of his legs there is a remarkable fold when he bends them in lying down, which disappears when he stands.

“The tail of this animal is very inconsiderable, in proportion to his bulk, not exceeding seventeen or eighteen inches in length, and not very thick. It has a great roughness round it, and a kind of twist or stricture towards the extremity, ending in a flatness, which gave occasion to authors to compare it to a spatula. On the sides of this flat part a few hairs appeared, which were black and strong, not short. It is further to be observed, that the hairs on the left side grow out a great way up towards the root of the tail, whereas on

the right side they grow no higher than the flat part. There is no other hair on this young rhinoceros, except a very small quantity on the posterior edge of the upper part of the ears. I have observed a very peculiar quality in this creature, of listening to any noise or rumour in the street; for though he were eating, sleeping, or under the greatest engagements nature imposes on him, he stops everything suddenly, and lifts up his head with great attention till the noise is over.

"The skin of the rhinoceros is thick and impenetrable. In running one's fingers under one of the folds and holding it up with the thumb at the top, it feels like a piece of board half an inch thick. It is covered all over, more or less, with hard incrustations like so many scabs, which are but small on the ridge of the neck and back, but grow larger by degrees downwards toward the belly, and are largest on the shoulders and buttocks, and continue pretty large upon the legs, all along down; but between the folds the skin is as smooth and soft as silk, and easily penetrated; of a pale flesh colour, which does not appear to view in the folds except when the rhinoceros extends them, but is always in view under the fore and hinder parts of the belly, but the middle is incrusted over like the rest of the skin.

"As to the performance of this animal's several motions, let us consider the great wisdom of the Creator in the contrivance that serves him for that purpose. The skin is entirely impenetrable and inflexible; if, therefore, it was continued all over the creature as the skins of other animals, without any folds, he could not bend any way, and consequently not perform any necessary action; but that suppleness in the skins of all other quadrupeds, which renders them flexible in all parts, is very well compensated in this animal by those folds; for since it was necessary his skin should be hard for his defence, it was a noble contrivance that the skin should be so soft and smooth underneath, that when he bends himself any way, one part of this board-like skin should slip or shove over the other, and that these several folds should be placed in such places of his body as might facilitate the performance of every voluntary motion he might be disposed to."

The rhinoceros utters a note like the grunt of a boar; it increases to a shrill sound when he becomes enraged. It will consume 124 pounds of vegetable food in the course of the day, and drink in proportion. The animal described by Dr. Parsons was fed with rice, sugar, and hay; "of the first he ate seven pounds to about three pounds of the sugar; they were mixed together, and he ate this quantity every day, divided into three meals, and about a truss of hay in the week, besides

greens of different kinds, which were often brought to him, and of which he seemed fonder than of his dry victuals, and drank large quantities of water at a time,—being then, as I was informed by his keeper, two years old. It was said by those who took care of him, that from the time of his being first taken, to the time of his landing in England, his expenses amounted to one thousand pounds sterling."

In a state of nature the rhinoceros commonly lives in solitude, moves slowly, with the head hanging down, and often ploughs the earth with his horn, uprooting vegetables, and casting behind him very large stones. When he runs, the tail is stiffly extended like that of a bull. As the rhinoceros consumes an immense quantity of vegetables and of water, he can only exist in places where they abound. The animal which was preserved at Versailles used frequently to enter and roll about in the water of his bath. In their native haunts these animals, notwithstanding the thickness of their hide, are tormented by the stings and bites of numerous insects; therefore, as a means of defence, they roll in the mud and slime, which, hardening in the sun, forms a sort of cuirass to the naked skin.

The flesh of the rhinoceros, though coarse and fibrous, is said to be similar in its flavour to pork, and better than that of the elephant.

The horn of the rhinoceros is much esteemed by the Asiatics: they make drinking-cups of them, believing them to be antidotes against poison: they are capable of a high polish, and are sometimes sculptured with considerable taste and delicacy. The hide is commonly employed to make whips.

An interesting memoir from the pen of M. Frederic Cuvier, has appeared in the splendid work published by him conjointly with M. Geoffroy St. Hilaire, on the animals in the menagerie in the Garden of Plants at Paris. It relates to the rhinoceros lately living in that establishment, and from which the figure was taken which serves to illustrate the present account.

"This rhinoceros was but young at the time that the figure was taken; and, contrary to the commonly received opinion, was habitually of a very gentle disposition, obedient to his keeper, and receiving his care and attention with a real affection. However, he would occasionally be seized with fits of fury, during which it was not prudent to come near him. No cause could be assigned for these violent paroxysms: one might say that a blind impulse or desire to regain a state of liberty, (which he had never enjoyed,) excited him to break

his chains, and escape from the bondage in which he was retained. Bread and fruits, however, always pacified him ; and the claims of hunger always silenced those of liberty ; so that this resource against his fury was always kept in reserve. He knew those persons who most indulged him in his *gourmandise*, and they were received with the liveliest manifestations of affection : the moment he saw them he stretched towards them his long upper lip, opened his mouth, and drew in his tongue. The narrow stall in which he was confined did not allow him to manifest much intelligence ; and his keeper took no other pains than to induce him to forget or misconceive his own strength, and to obey : but from the attention which he paid to everything which was passing around him, and from the readiness with which he distinguished individuals and recognised those circumstances which seemed the preliminaries of his receiving something agreeable to him, one can readily judge that his intelligence would have acquired a greater development under favourable circumstances. But his immense force, and the apprehensions constantly entertained that in one of his fits of passion he would break down his apartment, insured for him the most indulgent treatment ; nothing was required of him without a reward ; and the little degree of motion which was allowed him, was an additional reason for requiring from him no other actions than to open his mouth, turn his head to the right or to the left, hold up his leg, &c.

“This animal was brought from the Indies to England, from whence he was transported to Paris in 1815. He was thicker and still more unwieldy in his proportions than the elephant, although less in general size. His height at the highest part of his back was five feet six inches, and his length nearly eight feet ; his head measured two feet including the ears. The whole body was covered with a thick tubercular and almost naked skin, which formed a number of deep folds, almost too irregular to be described. It was of a deep violet-gray colour, which seemed almost black when oiled or greased ; and this kind of lubrication was performed twice or thrice a week to prevent the skin drying and crackling. Beneath the folds the integument was of a flesh colour, and much softer than at the other parts. At certain parts, as the outer side of the limbs, the knees, and on the head, the tubercles of the skin had acquired such a length, as to resemble horny threads, closely arranged in a parallel manner one against the other, and it is these papillæ which some authors have termed excrescences. The few hairs that are observable, are chiefly situated on the tail and ears, and are stiff, thick, and smooth :

some however of those which are met with on the rest of the body were curled; and although thick and hard, had a woolly appearance. His legs were bent inwards, which was without doubt owing to the close confinement he endured, and to the little strength his joints could acquire in the state of inaction in which he was kept. Each foot was composed of three toes, which were manifested externally only by the three nails with which they were furnished, and which had the form of hoofs, *i. e.* they defended the toes both above and below. The tail was habitually pendent, but was susceptible of voluntary movements to the right and left, and the animal made use of it to drive off from the skin whatever annoyed him.

“The eyes were very small, the eyelids simple, the pupil round, and no accessory organ was found there. The nostrils opened at the sides of the upper lip, and presented an aperture curved like the letter S, but more open in front than behind. The tongue was smooth, the lips entire, the lower one thick and rounded, the upper one very moveable, and susceptible of being extended, and curled downwards like a little proboscis. The ears were moderately large, moveable, and of very simple construction. With respect to the organ of touch, it can hardly possess much delicacy except in the upper lip.

“All the senses of this animal, save that of touch, appeared to be pretty delicate. He frequently made use of that of smell, and preferred sugared fruits and sugar itself over every other aliment. He collected together the smaller morsels of food with his moveable upper lip to carry them to his mouth: and when he ate hay, he formed it with his upper lip into little bunches, which he afterwards introduced between his teeth by means of his tongue.

“His horn is solid, attached to the bones of the nose, and composed of fibres of the same nature as the horns of goats and antelopes. It was short and blunt, and he made use of it to strike against objects at the moments of his rage, and even to tear up and destroy whatever he found could give way to his efforts. One might see that he was borne by an instinctive impulse to make use of that part in preference to every other whenever the employment of his strength was required.”

The learned Bishop Heber confirms the supposition of Frederic Cuvier, as to the tractability of the rhinoceros. In his journey through India, he observes: “At Lucknow there were five or six very large rhinoceroses, the first animals of the kind I ever saw, and of which I found that prints and

drawings had given me a very imperfect conception. They are more bulky animals, and of a darker colour than I had supposed, and the thickness of the folds of their impenetrable skin much surpasses all which I had expected. These at Lucknow are quiet and gentle animals, except that one of them has a feud with horses. They seem to propagate in captivity without reluctance, and I should conceive might be available to carry burthens as well as the elephant, except that as their pace is still slower than his, their use could only be applicable to very great weights, and very gentle travelling. These have sometimes had howdahs on them, and were once fastened in a carriage, but only as an experiment, which was never followed up."—vol. ii.

And in the third volume, he observes : "In passing through the city I saw two very fine hunting-tigers in silver chains ; and a rhinoceros, (the present of Lord Amherst to the Guicwar,) which is so tame as to be ridden by a Mohout quite as patiently as an elephant."

The able translator of Cuvier's Animal Kingdom observes : "The power of this species is frequently displayed to a surprising degree when hunting it. A few years ago, a party of Europeans with their native attendants and elephants, when out on the dangerous sport of hunting these animals, met with a herd of seven of them, led, as it appeared, by one larger and stronger than the rest. When the large rhinoceros charged the hunters, the leading elephants, instead of using their tusks or weapons, which in ordinary cases they are ready enough to do, wheeled round and received the blow of the rhinoceros's horn upon the posteriors ; the blow brought them immediately to the ground with their riders, and as soon as they had risen, the brute was again ready, and again brought them down ; and in this manner did the contest continue until four out of the seven were killed, when the rest made good their retreat.

"By comparing the tenour of these short observations of them in their wild condition and in a state of confinement, we may gather sufficient data on which to form a tolerable estimate of the character of these animals. Endowed with amazing powers of body,—powers which can repel, if not overcome the active ferocity of the lion and the ponderous strength of the elephant, but at the same time seeking their sustenance not by the destruction of animal life, but in the profuse banquet of the vegetable kingdom, they might naturally be expected to avail themselves of their physical power principally in self-defence. Accordingly we find that to the first aggressor the rhinoceros is a terrible enemy ; but if left to

the ordinary bent of his own inclination,—if unmolested, in short, he does not wantonly seek occasion to exercise his strength to the injury of other creatures.”*



BARON HUMBOLDT'S OBSERVATIONS ON THE GYMNOTUS, OR
ELECTRICAL EEL.

THE galvanic electricity of the *gymnotus* causes a sensation which can hardly be said to be specifically distinct from that which is occasioned by the conductor of an electrical machine, a Leyden jar, or even the voltaic pile. The same observation has been made respecting the torpedo, or electric ray. In the *gymnotus*, however, the difference that does exist is the more striking in proportion as the shocks are greater. No man exposes himself rashly to the first discharges of a strong and highly irritated *gymnotus*. If, by accident, a shock be received before the fish is wounded or tired out by the pursuit, this shock is so painful, that it is impossible even to find an expression to describe the nature of the sensation. I do not remember to have ever experienced, from the discharge of a large-sized Leyden jar, a shock so dreadful as one which I received on placing my feet on a *gymnotus* which had just been drawn out of the water. I felt during the rest of the day an acute pain in the knees, and in almost every joint of the body. A blow upon the stomach, a stone falling on the head, a violent electric explosion, produce instantly the same effect. We distinguish nothing when the whole nervous system is affected at once. To experience the difference believed to exist between the sensations produced by the voltaic pile

* Griffiths' Cuvier, vol. iii.

and electrical fishes, the latter must be touched when they are reduced to a state of extreme weakness. In that case we observe, that the electrical eels and torpedos cause twitchings of the muscles (*subsultus tendinum*), which are propagated along the arm, from the part resting on the electric organ up to the elbow. This trembling, which is not visible externally, slightly resembles the very slight commotions produced by our artificial electrical apparatuses. M. Bayon, some time ago, was struck with this difference; and the common people, to characterize the nature of this extraordinary sensation, still confound, so to say, the cause with the effect, and call the *gymnotus*, *Tremblador* in the Spanish colonies, and *An-guille tremblante* in French Guiana. In fact, on touching these electrical fishes, we seem to feel at every shock a vibration, an internal trembling, which lasts for two or three seconds, and which is followed by a painful numbness.

If the sensation which is experienced on the contact of the electric eel be different from that which is produced by the voltaic pile or Leyden jar, it is, however, very analogous to the pain caused by applying zinc and silver to wounds on the back and on the hand. These wounds, which I have myself made—one by means of the blistering fly, and the other by a slight incision—have furnished abundant and convincing proof of the relations which exist between the effect of electrical fishes, and that of the galvanic current established by the application of different metals upon the human body.

After having handled *gymnoti* for four hours consecutively, we felt, even till the next morning, a pain in the joints of the extremities, a debility in the muscles, and a general uneasiness, which was, without doubt, the consequence of a long and violent irritation of the whole nervous system. M. Van der Lott, surgeon at Essequibo, has published in Holland a Memoir on the Medical Properties of the Electrical Eel. Mr. Bancroft assures us, that at Demerara they are employed for the cure of paralytic subjects; but in the Spanish colonies they know nothing of this property in the *gymnotus*. The ancients, however, made use of the galvanic electricity of the torpedo, according to Scribonius Largus, in cases of head-ache, megrims, and gout. And such is all we know respecting medical electricity among the Greeks and the savages of America.

Persons most accustomed to electric shocks support, with repugnance, those given by a torpedo one foot four inches in length; but the power of a *gymnotus* is ten times greater, as we have seen by its effect upon horses. It often happens, in taking young crocodiles of two or three feet in length, and

little fishes in the same net with *gymnoti*, that the fishes are found dead, and the crocodile expiring. The Indians, in such cases, say that the young crocodile had not time to tear the net, because the *gymnotus* had paralysed and put him *hors du combat*. These terrible fishes, although carnivorous and of an aspect hideous as the serpent, are nevertheless in some measure docile, and naturally of a peaceable disposition. Much less active than our eels, they readily accustom themselves to their new prison ; they eat everything that is offered them, but without manifesting a great voracity. They do not discharge their violent shocks unless irritated ; and then especially if tickled along the under part of the body, at the transparent part of the electric organs, at the pectoral fin, the lips, the eyes, and especially if the skin be touched near the gill-cover. All these parts seem to be the most sensible, for here the skin is thinnest and least loaded with fat.

Fishes and reptiles which have never before felt the shocks of a *gymnotus*, do not seem to be warned of their danger by any particular instinct. Although its form and size are rather imposing, a little tortoise which we put into the same tub approached it with confidence ; it wanted to hide itself under the eel's belly ; but scarcely had it touched it with the end of one of its feet, when it received a shock, too feeble, indeed, to kill it, but strong enough to make it retire as far away as possible. From that moment the tortoise would no longer remain in the vicinity of the torpedo. And so, in all the pools or streamlets which it inhabits, one finds very few fishes of any other species. The *gymnotus* often kills without devouring its victim. It instinctively regards as an enemy everything that approaches it. Like a cloud surcharged with the electric fluid, he comes upon the fish he means to destroy ; when at a short distance from it, he rests for a few seconds, necessary perhaps to prepare the storm that is to burst, and then hurls his thunder against his devoted enemy."

—*From the Voyage of Humboldt and Bonpland.*

[The remainder of these observations, with the mode of taking the *gymnotus* by the natives, will be given in a future Number].

THE CUCKOO.

To the Editor of the Zoological Magazine.

SIR,

Liverpool, December 4, 1832.

ABOUT the middle of July 1829 I got possession of a young cuckoo, about half-fledged ; and on account of its insatiable

appetite I could never give it sufficient food, and my ears were incessantly dinned with its call. Very few days afterwards a young cock thrush came into my hands; and it being soon able to feed itself, for the sake of convenience I put the birds together into one large cage. They were not long together before the cuckoo scrambled up to the thrush and began its call, and continued it for several hours. I observed the thrush take a piece of meat towards its companion; and the idea occurred to me that if I left them alone, the thrush would feed it. I left the door of the room a little open, and did not wait watching long before I saw the young thrush feed the cuckoo. From this time I never had any more trouble; the cuckoo grew fat and healthy, and the thrush seemed quite satisfied with its state of servitude. Afterwards I determined to try if the cuckoo required all the help it received, and removed the thrush. In a few minutes I observed the cuckoo (apparently without any difficulty,) helping itself. In about a week I again replaced the thrush, and the cuckoo found its voice again and forgot how to take care of itself. The thrush did not relish its occupation; and it was not until after it had received a severe beating, and one of its eyes nearly torn out of its head, that it would feed the cuckoo again. The injury that the thrush received in its eye was the cause of its death a few weeks after. Since this experiment, I have been anxious to know what birds will attend to the cuckoo's cry; and I found the lark would sometimes do so, but more frequently beat it, and the cuckoo died of ill usage. A linnet which I placed with another cuckoo did its duty well for some time, but at last let the cuckoo die of neglect.—Perhaps some of your readers will follow up these experiments with me, that we may compare notes.

About the middle of September I was awakened by the constant fluttering the cuckoo made in its cage, which at night I always placed in my bed-room. After repeated watching at night, I found that from shortly after sun-set to a little before sun-rise, this bird for nearly a month continued to wave its wings as if in flight; and sometimes, as if forgetting that it was confined, it would hit its head against the top of the cage. I have no doubt it was instinct teaching it to quit our country, as during the period of its would-be emigration it was very quiet all day, but as soon as it was over, it became as lively, active, and noisy as ever.

Can any of your readers inform me where the cuckoo goes to? I find there are three kinds at the Cape of Good Hope during the summer, one very similar to that which visits us.

W. C.

QUADRUPEDS.—Those of our indigenous quadrupeds which exhibit the remarkable phænomenon of torpidity, as the Squirrel (*Sciurus vulgaris*), and more especially the Hedgehog (*Erinaceus Europæus*), and Dormouse (*Myoxus avellanarius*), are at this dreary season sunk in their deep repose, defended from the inclemency of the weather in retreats well lined with dry leaves and moss, and other non-conductors of heat. The dormouse commonly selects a cleft in a hazel-bush or black-thorn, about three or four feet from the ground, and carefully closes the aperture to its domicile when it has taken up its final abode. Hedgehogs make a snug retreat for themselves, where, imbedded in leaves and moss, they remain concealed for the winter.

BIRDS.—The Blackbird (*Merula vulgaris*), Thrush (*Turdus musicus*), Redbreast (*Sylvia rubecula*), Wren (*Anorthura communis*), Tomtit (*Parus cœruleus*), Hedgesparrow (*Sylvia modularis*), Skylark (*Alauda arvensis*), Woodlark (*Alauda arborea*), and Chaffinch (*Fringilla spiza*), begin to sing occasionally.

Those birds which in summer frequent woods and solitary places, now approach our dwellings. Several species of sea-fowl and water-birds may be met with on our rivers. Larks begin to congregate. The Missel Thrush (*Turdus viscivorus*) begins to build; and towards the end of the month the Redbreast (*Sylvia rubecula*), and Housesparrow (*Fringilla domestica*), commence their nests. The smallest of British birds, the Golden-crested Wren (*Sylvia regulus*), may now be seen in thick hedges near the house.

Some birds are accused of destroying the buds of trees at this season; but the truth is, that it is the insects frequenting the buds, and not the buds themselves, of which the birds are in search.

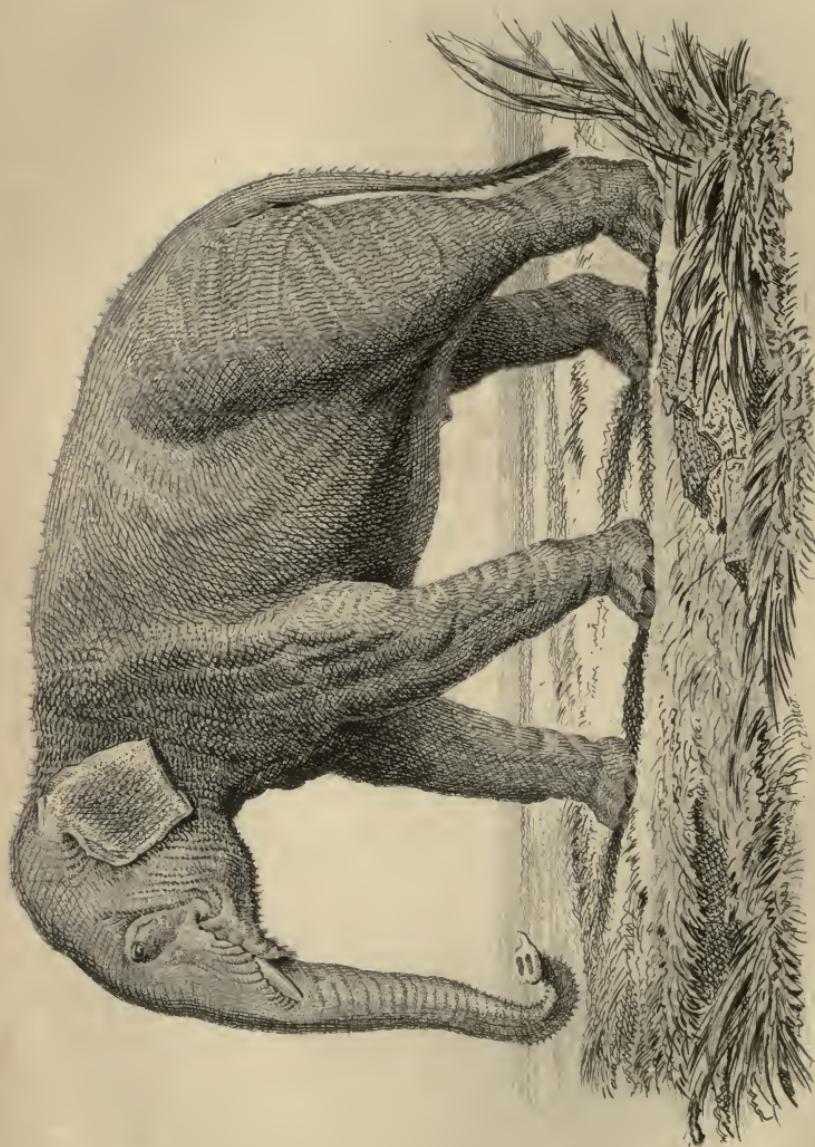
INSECTS swarm under hedges on sunny days. Gnats play about; spiders make their webs; bees appear.

The following may be occasionally met with during this month. The Peacock Butterfly (*Vanessa Io*), the Early Moth (*Cheimatobia rupicapraria*), the Bay Shoulder Moth (*Peronea spadiceana*), the Hearth Cricket (*Acheta domesticus*), the Dung Beetle (*Geotrupes stercorarius*), and the Chain Beetle, (*Carabus catenulatus*).

Notwithstanding the severe cold usual at this season, the eggs of many caterpillars which were deposited in autumn survive, and are hatched in the course of the spring.

Many small insects may also be found amongst mosses.





THE ASIATIC ELEPHANT.

THE
ZOOLOGICAL MAGAZINE.

THE ELEPHANT.

AFTER the numerous histories, compilations, and anecdotes respecting the Elephant which have appeared either as separate treatises, or in the periodical publications of the day, it may with some reason be supposed that the subject has been already exhausted, and that another description of this, though it be the most stupendous and interesting of quadrupeds, can afford very little either of novelty or entertainment. But a careful review of these several accounts convinces us that an accurate description of the species and varieties of the genus *Elephas*, and a faithful recital of those qualities which render this sagacious animal so useful an auxiliary to man in the most important of our colonial possessions, may still prove interesting to the lover of zoology at home, and useful, it is hoped, to those who now are, or are likely to become, residents in the East Indies.

All the accurate knowledge which we at present possess relative to the mode of propagation, the growth, the disposition, and faculties of the elephant, is founded on observations made upon the Asiatic species: and it may be doubted how far we are warranted in referring the attributes of this to the less commonly known elephant, which ranges uncontrolled in the wilds of Africa. Buffon indeed, and most writers previous to Cuvier, have applied the remarks of observers to both species indiscriminately, for it was not until they had been subjected to the penetrating scrutiny of the latter celebrated naturalist that their real specific difference was distinctly pointed out.

In this country it naturally happens, from our relations with the East Indies, that the elephant which is most commonly exhibited in menageries is of the Asiatic species. The two young individuals which have been seen to such advantage during the past summer in the Gardens of the Zoological Society are of this kind. In the menagerie at the Jardin des Plantes, however, there is at present a fine young African elephant (*Elephas Africanus*, Cuv.), as well as a noble Asiatic one (*Elephas Indicus*, Cuv.). Hence the most ample opportunities have been afforded to the eminent naturalists who have the charge of that truly national establishment

to determine accurately the sum and nature of their specific differences, and to furnish the world with figures of unquestionable fidelity, and executed under all the advantages of the present condition of the arts. These figures, which have recently appeared in the splendid illustrations of the Parisian menagerie, we have had faithfully copied and engraved for our present Number, so that the differences of form in the two species may be readily observed.

The head of the elephant of Africa is smaller, more elongated, and less irregular in its contour than that of the Asiatic species. The summit is rounded instead of being divided by a central longitudinal depression. But the most striking feature in the African elephant is the enormous size of his ears, which extend over his shoulders, and when agitated to and fro, beat the air with a violence and noise equal to that produced by the flapping of the wings of the condor or other huge bird. On the thick integument which invests the disproportionately small foot of the elephant five hoofs may be observed on the fore foot in both species, whilst on the hind foot four hoofs are observable in the Asiatic elephant, and three only in the African. We should be mistaken, however, in supposing that the number of toes strictly corresponded to these outward indications; for in both species, when the skin and flesh are removed and the bony framework is exposed, these huge productions of nature are seen to have been constructed on the same plan, and the ultimate divisions of all the four extremities are seen in the skeleton to be into five distinct parts or toes.

It has been observed that the extremity of the proboscis in the African elephant is better constructed as a prehensile organ, and that he seizes thin substances with greater ease and effect than his Eastern relative. The tail in the African species is shorter by half its length than in the Asiatic.

These characters are open to superficial inspection, and may be readily seized by the youngest student of zoology: but the most important specific distinction requires a closer investigation: it is derived from the differences presented by the worn-down surfaces of the grinding teeth;—those of the Asiatic elephant presenting parallel transverse wavy ridges, while the African's grinders are marked by transverse lozenge-shaped ridges.

The degree of difference, therefore, between those two animals, when strictly considered with reference to the modern methods in zoology, is even greater than usually separates species such as the dog and wolf; and is equivalent rather to that which distinguishes the dog from the hyena. A distinct

generic name (*Loxodonte*) has therefore been proposed for the African elephant.

The obscurity which formerly prevailed respecting the mode of reproduction of the elephant has been dissipated in a great measure by the accurate and assiduous observations of our countryman, Mr. Corse. And it is a remarkable instance of the difficulty of eradicating a popular error or prejudice, that notwithstanding the circumstantial evidence and authentic description given by this gentleman relative to the above subject, it is still very generally believed that in a state of subjection the elephant is unalterably barren; and that though it has been reduced under the dominion of man for ages, yet, as if it had a proper sense of its degraded condition, it refuses to increase the pride and power of its conquerors by propagating a race of slaves. This circumstance was adduced by Buffon as one of the most striking instances of the superiority of the elephant, in its moral condition, over other quadrupeds.

Mr. Corse, who resided for more than ten years at Tiperah, a province of Bengal, where herds of elephants are taken every season, and who for five years had the Company's elephant hunters entirely under his direction, has completely disproved these assertions. Twice during that period he succeeded in breeding from elephants in a state of captivity and servitude, and observes that this mode of supplying the Indian community with so useful an animal is abandoned only from its being more expensive than the ordinary method by the capture of the wild herds; since the elephants, after being reduced by the process of training, require rest and high feeding to bring them into the requisite condition.

In this way was ascertained the precise period of gestation in the elephant, which Mr. Corse states to be twenty months and eighteen days. The young animal when born is $35\frac{1}{2}$ inches high. It soon begins to nibble and suck the breast, pressing it with its trunk to make the milk flow more readily into its mouth while sucking. It has never been observed to use its proboscis in any other manner during this act, but invariably seized the nipple with the side of its mouth.

At this period it is a common practice with the elephant attendants to raise a small mound of earth, about six or eight inches high, for the young one to stand on, and thus to save the mother the trouble of bending her body every time she gives suck; for she has never been observed to lie down for that purpose. The nipples are two in number, and are situated between the fore legs.

It is remarkable that the elephant, although having but one

young, has by no means a strong affection for it: instances have occurred of the mother leaving her offspring and escaping into the woods. If a wild elephant happens to be separated from her young for only two days, though giving suck, she never afterwards recognises or acknowledges it. "I have been much mortified," says Mr. Corse, "at such unnatural conduct, particularly when it was evident the young elephant knew its dam, and by its plaintive cries and submissive approaches solicited her assistance."

During the first year the elephant grows eleven inches, and is three feet eleven inches high; in the second he grows eight inches; in the third six; in the fourth year five inches; about the same in the fifth year; in the sixth year three inches and a half; and in the seventh year two inches and a half,—measuring then six feet four inches in height. During the succeeding ten years the growth is comparatively slow.

The male is longer in attaining his full growth than the female, seldom having acquired it before his twenty-sixth year.

The height of the elephant has been much exaggerated. In India the height of the female is in general from seven to eight feet, and that of the male from eight to ten feet, measured at the shoulder.

"I have never heard," says Mr. Corse, "but of one elephant, on good authority, that much exceeded ten feet; this was a male belonging to the Vizier of Oude. The admeasurements of this animal were as follow:—

	Feet.	In.
From foot to foot over the shoulder	22	10 $\frac{1}{2}$
From the top of the shoulder, perpendicular height . . .	10	6
From the top of the head when set up as he ought to march in state	12	2
From the front of the face to the insertion of the tail . .	15	11

"The Madras elephants have been said to be from seventeen to twenty feet high: but to show how much the natives of India are inclined to the marvellous, and how liable Europeans themselves are to mistakes, I will relate a circumstance that happened to myself.

"Having heard from several gentlemen who had been at Dacca that the Nabob there had an elephant about fourteen feet high, I was desirous to measure him, especially as I had seen him often myself during the year 1785, and then supposed him to be above twelve feet. After being at Tiperah, and having seen many elephants caught, and finding all of them much inferior in height to what I supposed the Nabob's

elephant, I went to Dacca in 1789, determined to see this huge animal measured. At first I sent for the driver, to ask some questions concerning this elephant; he without hesitation assured me he was from ten to twelve cubits, that is, from fifteen to eighteen feet high; but added, he could not without the Nabob's permission bring me the elephant to be examined. Permission was accordingly asked and granted. I had him measured exactly, and was rather surprised to find he did not exceed ten feet in height."

The Hon. Company's standard for serviceable elephants is seven feet and upwards, measured at the shoulder in the same manner as horses are. At the middle of the back they are considerably higher, the curve of which, particularly in young elephants, makes a difference of several inches. After an elephant has attained his full growth, it is a sure sign of old age when this curve becomes less, and still more so when the back is flat or a little depressed. A partial depression of the spine is however not unfrequently observed even in very young elephants, and is in general the effect of external injury: for in herds of wild elephants just taken, Mr. Corse observes, "it is no uncommon circumstance for the large elephants, both male and female, to vent their rage upon the young ones, putting the projecting part of the upper jaw, from which the tusks grow out, on the spine of the young ones, and pressing them violently to the ground, while they roared out from pain."

Having thus described the differences which characterize the African and Asiatic elephants, and traced the latter from its birth to its maturity, we shall next briefly advert to such circumstances as may be most usefully known to those destined to reside in our Indian dominions. The impositions practised by the elephant dealers upon the inexperienced European in the purchase of this expensive animal, are as common in India as those of the horse-jockey in our own country; for not only do the elephants participate in as many various bodily defects as the horse, but they exhibit as great varieties of disposition.

When the price of a perfect elephant is demanded, the buyer should assure himself, first, that the animal is of the full size—if a male, not less than eight feet high, with the arch or curve of his back rising gradually from the shoulder to the middle, and thence descending to the insertion of the tail; and that all the joints are firm and strong: the nails should not be overgrown, and should be perfect in number, viz. five nails on each of the fore feet, and four on each of the hind ones, making eighteen in all; the tusks perfect and unbroken;

the head well set on, and carried rather high ; the ears large and rounded, not ragged or indented at the margin ; the eyes of a dark hazel colour, free from specks ; the roof of the mouth and tongue without dark or black spots of any considerable size ; the trunk large, and the tail long, with a tuft of hair reaching nearly to the ground.

There are some other points of less consequence which are taken notice of by the natives as well as Europeans ; but the qualities above mentioned ought to be associated in every animal for which the full price is demanded, whatever may be its race or variety.

Two principal varieties of elephant are recognised in Bengal, viz. the *Koomereah* (or princely caste) and the *Merghee* (or hunting caste) ; and these are not distinguished by the size or form of the tusks, which serve merely to characterize subordinate varieties in these two principal forms. The *koomereah* is a deep-bodied, strong, compact elephant, with a large trunk, and the legs short but thick in proportion to the size of the animal. The *merghee* when full grown is generally taller than the former, but has not so compact a form, nor is he so strong, or so capable of bearing fatigue. His legs are long ; he travels fast ; has a lighter body, and his trunk is both short and slender in proportion to his height. A large trunk is always esteemed a great beauty in an elephant ; so that the *koomereah* is preferred, not only for this, but for its superior strength, by which it can undergo greater fatigue and carry heavier loads than the *merghee*.

A breed from a pure *koomereah* and *merghee* is termed *Sunkareah* (or mixed breed) : but besides these three, several other varieties are generally to be found in the same herd ; but the nearer an elephant approaches to the true *koomereah* caste the more he is preferred, especially by the natives, and the higher price he will consequently bear. Europeans are not so particular, and will sometimes prefer a *merghee* female for hunting and riding on, when she is known to have remarkably good paces, and to be of a mild and tractable disposition.

The incisors or cutting teeth assume in the elephant the peculiar form which has obtained for them the name of tusks. They exist in the upper jaw only, and are two in number. In the females of the Asiatic species they are so small as not to appear beyond the lip ; in the African species they are very large, and of equal size in both the sexes. In the Asiatic males they project in some individuals to a considerable distance from the mouth, whilst in others their size scarcely exceeds that of the tusks in the female. Now both these varieties are found in the *koomereah* as well as

in the *merghee* castes. The long-tusked males are termed *Dauntelahs* (or toothed males); the short-tusked ones, *Mooknahs* (or face-males).

The animal figured at the commencement of the present Number is a *mooknah* of the *koomereah* variety, and is hardly to be distinguished by his head from a female of the same kind.

Notwithstanding the difference in the appearance of a *mooknah* and a *dauntelah*, yet if they are of the same caste, size, and disposition, and free from any defect or blemish, there is scarcely any difference in their price.

The *dauntelah* is generally more daring and less manageable than the *mooknah*: for this reason, until the temper and disposition of the two species are ascertained, Europeans will prefer the *mooknah*; but the natives, who are fond of show, generally take their chance and prefer the *dauntelah*, which, when known to be of a mild and gentle disposition, will always be preferred both by Europeans and natives.

It is obvious that particulars similar to those above recited, could only have been ascertained after a long and intimate association of the elephant with the wants and luxuries of civilized man: and as this stupendous quadruped is not, like the ordinary domesticated animals, a born slave, but in every instance must be withdrawn by fraud and force from its native swamps and forests, our readers we are sure will excuse our digressing from the strictly descriptive account to which we had proposed to limit ourselves in the present Number, in order to lay before them a brief sketch of the modes in which the elephant is entrapped.

The rudest of these contrivances, and probably the one which was earliest adopted, is to dig a pit, and cover the mouth over with a light wooden platform, concealed by branches of trees, grass, and herbs of which the elephant is fond. A trap of this kind must however have rarely proved successful, in consequence of the intuitive caution which the elephant uniformly manifests when treading upon insecure and suspicious ground. In the event of one being thus captured, he is left in the pit until his violence subsides, and he is rendered sufficiently tractable by starvation; and he is liberated, by throwing in sheaves of jungle grass, which the sagacious animal treading under foot, at length attains, as they accumulate, an elevation which enables him to step out of the pit. Thus subdued, the captive elephant is soon made the instrument of enslaving his species; and in this he exercises considerable ingenuity, courage, and perseverance.

Mr. Corse observes*, "In the month of November, when the

* *Asiatic Researches*, vol. iii.

weather has become cool, and the swamps and marshes formed by the rains in the five preceding months are lessened, and some of them dried up, a number of people are employed to go in quest of elephants.

“ At this season the males come from the recesses of the forest into the borders and outskirts thereof, whence they make nocturnal excursions into the plains in search of food, and where they often destroy the labours of the husbandman, by devouring and trampling down the rice, sugar-canæs, &c. that they meet with. A herd or drove of elephants, as far as I can learn, has never been seen to leave the woods ; some of the largest males often stray to a considerable distance, but the young ones always remain in the forest under the protection of the Palmai (or leader of the herd), and of the larger elephants. The Goondahs (or large males), come out singly or in small parties, sometimes in the morning, but commonly in the evening, and they continue to feed all night upon the long grass that grows amidst the swamps and marshes, and of which they are extremely fond. As often, however, as they have an opportunity, they commit depredations on the rice-fields, sugar-canæs, and plantain-trees that are near, which oblige the farmers to keep regular watch, under a small cover, erected on the tops of a few long bamboos about fourteen feet from the ground ; and this precaution is necessary to protect them from the tigers, with which this province abounds. From this lofty station the alarm is soon communicated from one watchman to another, and to the neighbouring villages, by means of a rattle, with which every one is provided. With their shouts and cries and noise of the rattles, the elephants are generally scared, and retire. It sometimes, however, happens that the males advance even to the villages, overturn the houses, and kill those who unfortunately come in their way, unless they have had time to light a number of fires ;—this element seems to be the most dreaded by wild elephants, and a few lighted wisps of straw or dried grass seldom fail to stop their progress.

“ To secure one of the males, a very different method is employed from that which is taken to secure a herd : the former is taken by Koomkees, (or female elephants trained for the purpose), whereas the latter is driven into a strong inclosure called a Keddah. As the hunters know the places where the elephants come out to feed, they advance towards them in the evening with four koomkees, which is the number of which each hunting party consists ; when the nights are dark, —and these are the most favourable nights for their purpose, —the male elephants are discovered by the noise they make in

cleaning their food by whisking and striking it against their fore legs, and by moonlight they can see them distinctly at some distance. As soon as they have determined on the Goondah they mean to secure, three of the koomkees (or decoy elephants) are conducted silently and slowly by their Mahotes (drivers) at a moderate distance from each other, near to the place where he is feeding ; the koomkees advance very cautiously, feeding as they go along, and appear like wild elephants that had strayed from the herd. When the male perceives them approaching, if he takes the alarm and is viciously inclined, he beats the ground with his trunk and makes a noise, showing evident marks of his displeasure, and that he will not allow them to approach nearer ; and if they persist, he will immediately attack and gore them with his tusks ; for which reason they take care to retreat in good time. But should he be amorously disposed, as is generally the case, (as these males are supposed to be driven from the herd at a particular period by their seniors, to prevent their having connexion with the females of that herd,) he allows the females to approach, and sometimes even advances to meet them. When from these appearances the mahotes judge that he will become their prize, they conduct two of the females, one on each side, close to him, and make them advance backwards and press gently against his neck and shoulders ; the third female then comes up and places herself directly across his tail : in this situation, so far from suspecting any design against his liberty, he begins to toy with the females and caress them with his trunk : while thus engaged, the fourth female is brought near, with ropes and proper assistants, who immediately get under the belly of the third female, and put a slight cord (the Chilkah) round his hind legs ; should he move, it is easily broken, in which case, if he takes no notice of this slight confinement, nor appears suspicious of what was going forward, the hunters then proceed to tie his legs with a strong cord (called Bunda), which is passed alternately, by means of a forked stick and a kind of hook, from one leg to the other, forming a figure of 8 ; and as these ropes are short, for the convenience of being more readily put around his legs, six or eight are generally employed, and they are made fast by another cord (the Dagbearee), which is passed a few turns perpendicularly between his legs, where the folds of the bundahs intersect each other. A strong cable (called the Phand,) with a running noose, sixty cubits long, is next put round each hind leg, immediately above the bundahs ; and again above them, six or eight additional bundahs, according to the size of the elephant, are made fast, in the same manner as the

others were. The putting on these ropes generally takes up about twenty minutes, during which the utmost silence is observed; and the mahotes, who keep flat upon the necks of the females, are covered with dark-coloured cloths, which serve to keep them warm, and at the same time do not attract the notice of the elephant.—While the people are busily employed in tying the legs of the goondah, he caresses sometimes one, sometimes another, of the seducers. In case of accidents, however, should the goondah get loose, the people upon the first alarm can always mount on the backs of the tame elephants, by a rope which hangs ready for the purpose, and thus get out of his reach. When his hind legs are properly secured, they leave him to himself, and retire to a small distance; as soon as the koomkees leave him, he attempts to follow, but, finding his legs tied, he is roused to a proper sense of his situation, and retreats towards the jungle; the mahotes follow at a moderate distance from him on the tame elephants, accompanied by a number of people that had been previously sent for, and who, as soon as the goondah passes near a stout tree, make a few turns of the phands (or long cables that are trailing behind him,) around its trunk: his progress being thus stopt, he becomes furious, and exerts his utmost force to disengage himself, nor will he then allow any of the koomkees to come near him; he is outrageous for some time, falling down and goring the earth with his tusks. If by these exertions the phands are once broken, which sometimes is effected, and he escapes into the thick jungle, the mahotes dare not advance for fear of the other wild elephants, and are therefore obliged to leave him to his fate; and in this hampered situation, it is said, he is even ungenerously attacked by the other wild elephants. As the cables are very strong and seldom give way, when he has exhausted himself by his exertions, the koomkees are again brought near, and take their former positions, viz. one on each side, and the other behind. After getting him nearer the tree, the people carry the ends of the long cables around his legs, then back and about the trunk of the tree, making if they can two or three turns, so as to prevent even the possibility of his escape. It would be almost impossible to secure an elephant in any other manner, as he would tear up any stake that could at the time be driven into the ground, and even the noise of doing it would frighten the elephant; therefore nothing less than a strong tree is ever trusted to by the hunters.

“ For still further security, as well as to confine him from moving to either side, his fore legs are tied exactly in the same

manner as the hind legs were, and the phands or cables are made fast, one on each side, to trees or stakes driven deep into the earth. During the process of tying both the hind and fore legs, the fourth koomkee, or decoy elephant, gives assistance where necessary, and the people employed cautiously avoid going within reach of his trunk ; and when he attempts to seize them, they retreat to the opposite side of the koomkees, and get on them if necessary, by means of the rope above mentioned, which hangs ready for them to lay hold of.

“ Being thus secured, he is left, until, wearied by his fruitless exertions, he becomes more subdued. An abundant supply of food is placed near him ; and after he has eaten of it, the necessary preparations are made to carry him off, by means of additional girths and strong ropes passed round his body and attached to two of the tame females.

“ Every thing being now ready, and a passage made from the jungle, all the ropes are taken off his legs, and only the strong rope remains round his hips to confine the motion of his hind legs ; the koomkees pull him forwards by the large cables, and the people from behind urge him on. Instead of advancing in the direction they wish, he attempts to retreat further into the jungle ; he exerts all his force, falls down, and tears the earth with his tusks, screaming and groaning, and by his violent exertions often hurts and bruises himself very much ; and instances happen of their surviving these violent exertions only a few hours, or at most a few days. In general, however, they soon become reconciled to their fate, will eat immediately after they are taken, and, if necessary, may be conducted from the verge of the jungle as soon as a passage is cleared. When the elephant is brought to his proper station and made fast, he is treated with a mixture of severity and gentleness, and in a few months (if docile) he becomes tractable, and appears perfectly reconciled to his fate.

“ It appears somewhat extraordinary, that though the goondah uses his utmost force to disengage himself when taken, and would kill any person coming within his reach, yet he never, or at least seldom, attempts to hurt the females that have ensnared him, but on the contrary seems pleased, (as often as they are brought near, in order to adjust his harnessing, or move and slacken those ropes which gall him,) soothed and comforted by them, as it were, for the loss of his liberty.”

The more wholesale method of taking the wild elephants by the keddah, is of course a much more complex and tedious one, often requiring a period of several weeks, and the

exertions of five hundred people to effect the successful capture of a herd.

As the elephant is naturally of a social disposition, they congregate in troops of from forty to one hundred, under the guidance of one of the oldest and largest of the females and one of the largest males.

When a herd is discovered, the hunters disperse themselves so as to form an irregular circle, in which the elephants are inclosed. They then light fires and form tracts of communication with each other, so as to be able to concentrate themselves at any part of the circle which may be threatened with an attack from the inclosed herd.

“The first circle being thus formed, the remaining part of the day and night is spent in keeping watch by turns, or in cooking for themselves and companions. Early next morning one man is detached from each station, to form another circle in that direction where they wish the elephants to advance. When it is finished, the people stationed nearest to the first circle put out their fires, and file off to the right and left to form the advanced party, thus leaving an opening for the herd to advance through ; and by this movement both the old and new circle are joined and form an oblong. The people from behind now begin shouting and making a noise with their rattles, tomtoms, &c. to cause the elephants to advance ; and as soon as they are got within the new circle the people close up, take their proper stations, and pass the remaining part of the day and night as before. In the morning the same process is repeated, and in this manner the herd advances slowly in that direction where they find themselves least incommoded by the noise and clamour of the hunters, feeding, as they go along, upon branches of trees, leaves of bamboos, &c. which come in their way. If they suspected any snare, they could easily break through the circle ; but this inoffensive animal going merely in quest of food, and not seeing any of the people who surround him, and who are concealed by the thick jungle, advances without suspicion, and appears only to avoid being pestered by their noise or din.”

This process is repeated until the elephants are gradually brought to the keddah, or place where they are to be secured. This Mr. Corse describes as being composed of three distinct inclosures, communicating with each other by means of narrow openings or gateways, the last or furthermost into which the elephants are driven being the smallest.

“When the herd is brought near to the first inclosure, or Baigcote, which has two gateways towards the jungle, from which the elephants are to advance, (these as well as the other

gateways are disguised with branches of trees and bamboos stuck in the ground, so as to give them the appearance of a natural jungle,) the greatest difficulty is to get the herd to enter the first or outer inclosure: for notwithstanding the precautions taken to disguise both the entries, as well as the palisades which surround this inclosure, the Palmai (or leader) now appears to suspect some snare, from the difficulty and hesitation with which in general she passes into it; but as soon as she enters, the whole herd implicitly follows.

“Immediately, when they are all passed the gateway, fires are lighted round the greatest part of the inclosure, and particularly at the entries, to prevent the elephants from returning. The hunters from without then make a terrible noise by shouting, beating of tomtoms (a kind of drum), firing blank cartridges, &c. to urge the herd on to the next inclosure. The elephants, finding themselves ensnared, scream and make a noise; but seeing no opening except the entrance to the next inclosure, and which they at first generally avoid, they return to the place through which they lately passed, thinking perhaps to escape, but now find it strongly barricadoed, and as there is no ditch at this place, the hunters, to prevent their coming near and forcing their way, keep a line of fire constantly burning all along where the ditch is interrupted, and supply it with fuel from the top of the palisade, and the people from without make a noise, shouting and hallooing to drive them away. Wherever they turn they find themselves opposed by burning fires, or bundles of reeds, or dried grass, which are thrust through the opening of the palisades, except towards the entrance of the second inclosure. After traversing the baigcote for some time, and finding no chance of escaping but through the gateway into the next inclosure, the leader enters and the rest follow: the gate is instantly shut by people who are stationed on a small scaffold immediately above it, and strongly barricadoed; fires are lighted, and the same discordant din made and continued till the herd has passed through another gateway into the last inclosure, the gate of which is secured in the same manner as the former was. The elephants being now completely surrounded on all sides, and perceiving no outlet through which they can escape, appear desperate, and in their fury advance frequently to the ditch in order to break down the palisades, inflating their trunks, screaming louder and shriller than any trumpet, sometimes grumbling like the hollow murmur of distant thunder;—but wherever they make an attack, they are opposed by lighted fires, and by the noise and triumphant shouts of the hunters. As they must remain some time in this inclosure, care is always taken to have part of the ditch filled with

water, which is supplied by a small stream, either natural or conducted through an artificial channel from some neighbouring reservoir. The elephants have recourse to this water to quench their thirst and cool themselves, after their fatigues, by sucking the water into their trunks, and then squirting it over every part of their bodies. While they remain in this inclosure they continue sulky, and seem to meditate their escape ; but the hunters build huts and form an encampment as it were around them close to the palisade ; watchmen are placed, and every precaution used to prevent their breaking through. This they would soon effect if left to themselves, notwithstanding the palisade is made of very strong stakes stuck into the earth on the outside of the ditch, and strengthened by cross bars and buttresses, as already mentioned." In this inclosure they are kept confined for a few days ; after which they are enticed one by one into a passage leading from the keddah, too narrow for them to turn round in, and from which retreat or advance is prevented. When a large elephant finds himself inclosed in this place, he advances and exerts his utmost force to break down the bars, which were previously put across a little further on in the outlet, by running against them, screaming and roaring, and battering them like a ram, by repeated blows of his head, retreating and advancing with the utmost fury. In his rage, he rises and leaps upon the bars with his fore feet, and strives to break them down with his huge weight. When the elephant is somewhat fatigued by these exertions, he is bound in nearly the same manner as the elephant captured singly by means of the decoy females ; and is afterwards led away and treated in a similar manner.

It is a remarkable fact that the elephant, notwithstanding its boasted sagacity and power of memory, will suffer itself to be a second time driven into the keddah, after having regained its liberty, though it has lived only for eighteen months wild in the woods. Mr. Corse relates an instance of this kind, where a runaway male in a surrounded herd, instead of taking alarm as might have been expected on the first shout of the hunters, and setting the example to its inexperienced companions of breaking through the line, suffered itself to be driven from circle to circle to the last fatal inclosure, where, notwithstanding he at first appeared equally wild and fierce with the rest, yet the moment he was addressed in a commanding tone the recollection of his former obedience seemed to rush upon him at once, and without any difficulty he permitted a driver to be seated on his neck, who in a few days made him as tractable as ever.

The difference of disposition in the captured elephants is so

great, that a given time for rendering them safely manageable can hardly be assigned. An instance has occurred where every effort has been made for ten years to reduce an elephant to obedience, but in vain. This animal was repeatedly offered for sale at a low price, but his character was so well known that no one would purchase him.

The process of training an elephant, so that he shall perform the ordinary duties and learn to be guided from place to place, is mostly effected by a series of coaxings and rewards, rarely of punishment. He is entirely under the care of one individual, who is destined to be his future conductor. This man, seated on his neck, guides him by means of an iron instrument shaped like a boat-hook, called the Hawkniss. With this he twitches his ear, or presses the point on his head or neck; which actions being combined with pressure of the knees on the sides of the neck, the elephant learns to understand as the horse does the applications of the bitt or spur. Instances, however, have occurred where an injudicious and brutal use of the hawkniss has so enraged the noble animal that he has torn his driver from his seat, and dashed him to pieces.

Notwithstanding the massiveness of his frame, the elephant is not without a certain degree of lightness in his motions. He has a tolerably quick trot, and easily overtakes a man at full speed; but as he cannot turn rapidly, one may escape by turning suddenly to one side. Being specifically lighter than water, he easily swims; and his motions in that element are of the most free and lively description. Every one who enjoyed the sight of the elephant sporting in his bath at the Zoological Gardens during the summer of last year must acknowledge the gratification and surprise excited by the ease and variety of his actions. Notwithstanding, however, the liberal space allowed for his paddock and pond, our sagacious animal seemed not contented until he had rendered his domain still more analogous to the favourite haunts of his species in their native clime. This he effected by forming a miniature swamp in the immediate proximity of his pond, pumping up with his proboscis repeated quantities of water, and treading it into the soil, which thus was soon converted into a mud bath of a few feet in depth. In this he seemed peculiarly delighted, rubbing and rolling himself about, and expressing his gratification at the same time by uttering peculiar shrill guttural notes, and flapping his ears.

In a state of nature this species prefers the banks of rivers, for heat as well as cold annoys him. He is under a constant necessity of moistening his hard and rough skin, which other-

wise is so apt to be excoriated ; and he not only waters it, but throws over it dust, grass, straw, &c.

Although this integument is so thick, it appears nevertheless to be extremely sensible, especially about the face, the legs, and the under part of the neck and body. We have sometimes seen the young elephant above mentioned, in the Society's menagerie, take a small branch in his trunk, and switch away the flies the moment they alighted on any of those parts.

The hairs are few and scattered, but are most abundant on the upper part of the head and neck. It is probable that their growth may be excited by the change of climate ; and the young elephants seem more abundantly supplied in this respect than the adult.

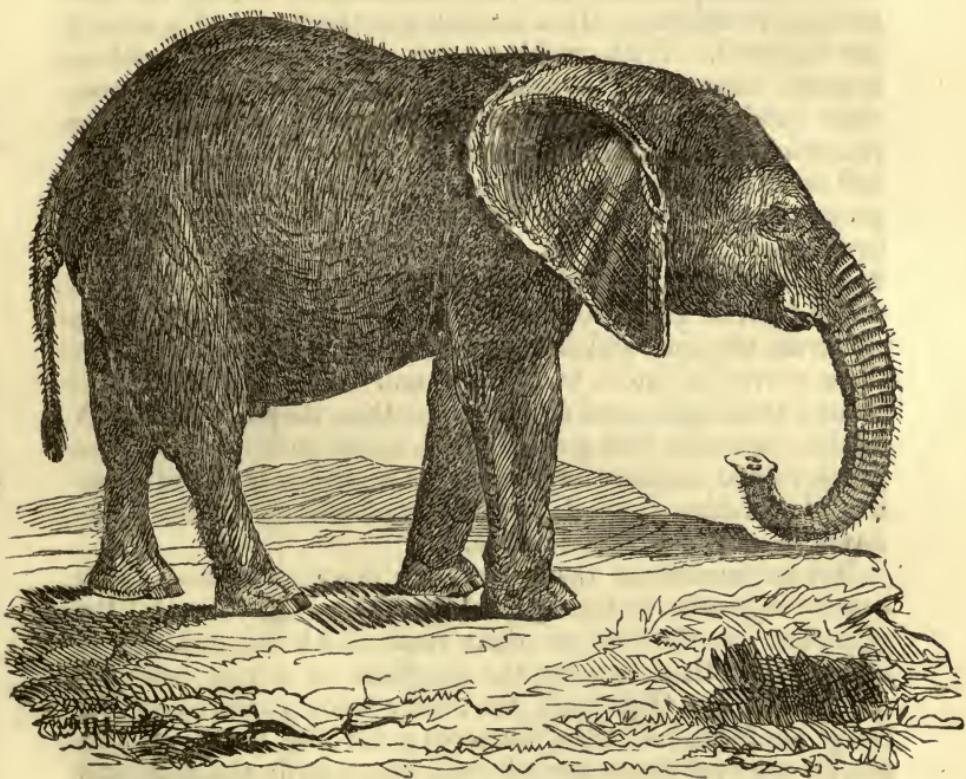
We shall return to this subject in a future Number, when we come to speak of the extinct species of elephant which was found frozen in the river Lena in Siberia ; as the skin of this singular animal was found defended with both wool and hair.

Although the proboscis of the elephant is a continuation of the nose, it is not properly a continuation of the organ of smell, the membrane with which it is lined not being adapted to receive the impressions of odorous particles. In fact, had it been so, it would not have been adapted for its real and more important uses, viz. of conveying the aliment to the mouth, more especially liquids. When he drinks, he draws up the water into his trunk by a kind of inspiration, and having filled the two canals which traverse it, he carries the extremity of it to the back of the mouth, and (the upper part of the windpipe being protected from the current) empties the canals by a violent expiration, and literally blows the water down his throat. Of his mode of taking up solid substances little need be said. If they are very small, they are seized between the finger-like process of the trunk and the opposite flattened part, as between a finger and thumb ; if of larger size, the end of the proboscis is turned round them ; if scattered upon the surface of the ground, he sweeps a larger proportion of his inimitable prehensile organ around them, and assists it by opposing his fore foot to the substances he is collecting in a mass, and thus prevents them receding from the trunk. By means of his fore foot also he strikes up the earth or gravel into a heap, around which he twines his trunk, then changing the curve from the horizontal to the vertical direction, lifts up all that lies on the concavity of the curve, and dexterously flings it over his head.

The utility of the domestic elephant is chiefly experienced

in transporting heavy burdens : in modern warfare he is used only to carry baggage or drag along artillery ; his dread of fire rendering him in actual battle more dangerous to his employers than their enemies.

His consumption of food, however, is immense, and renders him an expensive auxiliary. In India he requires daily one hundred pounds of rice, to which must be added fresh vegetables and fruits : the finer animals of the rich are also treated with butter and sugar.—The full-grown elephant *Chunee*, when in Mr. Cross's collection at Exeter 'Change, consumed daily three trusses of hay, and about two hundred weight of carrots and other fresh vegetables, together with from sixty to eighty gallons of water.



THE AFRICAN ELEPHANT.*

IN the preceding description the elephant is seen under all the favourable circumstances that an association with man is calculated to produce. His wants being supplied, his passions

* When this figure was taken, the tusks had not appeared.

moderated, and his intellectual powers developed by tuition, we find him elevated to the highest degree of perfection his nature can sustain ; and in return he renders all his endowments subservient to the wants and luxuries of his master.

But in the history of the elephant of Africa the scene is sadly reversed. In the wild regions which he traverses we find that in his relations to mankind, mutual fear and deadly enmity usurp the place of services and benefactions.

How often in the records of African travellers is the following picture presented ! A tribe of Africans of a mild and unwarlike disposition cultivate a fertile spot on the banks of some large stream, and subsist on the produce of their rice grounds, fields of maize, and plantations of sugar-cane. The time of harvest having arrived, they rejoice at the ample store of nutriment provided for their subsistence during the unproductive months. In a single night the hopes of a season are blighted. With rushing noise and the earth trembling beneath their tread, a herd of wild and hungry elephants come suddenly upon the devoted settlement, attracted by the ripened vegetables. The poor negroes, surprised in sleep, and destitute of fire-arms, in vain attempt to oppose the progress of these formidable invaders. Their simple huts are overturned ; and such as are unable to escape are beaten down with an irresistible blow of the proboscis, trodden under foot, or gored to death. The morning displays to the survivors the spot which had been occupied by their plantations converted into a wilderness and swamp ; for the elephants tread down and destroy more than they consume. A famine succeeds, and pestilence its usual concomitant ; and the wretched remnant of the tribe are driven to the alternative of perishing through hunger, or of selling themselves as slaves to a more fortunate tribe.

But for occasional ravages of this description man takes ample vengeance, by the unceasing warfare waged against the offenders for the sake of their tusks. All the methods of capture practised against the elephant of Africa have his destruction for their end, his utility being confined to the ivory he furnishes for commerce ; for the tusks of this species are very large, and of equal size both in the male and female. We are informed by Lander that the negroes inhabiting the banks of the Niger employ a very simple stratagem to insure the destruction of their ponderous and dreaded neighbour. In one of the beaten tracks by which the elephants pass down from the forests to bathe in the stream, a lance is fixed in the ground, pointing towards the part from which they issue : this being concealed by brushwood, pene-

trates the abdomen of the foremost elephant, who feeling the smart, instead of retreating backwards blindly rushes on with augmented speed, and thus is mortally wounded.

In the neighbourhood of the Cape, and in other parts of the coast of Africa, where commercial settlements are situated, and fire-arms have been introduced, those weapons are commonly employed. This method of destruction requires great courage, patience, and capability of bearing fatigue, and is attended with considerable personal risk to the hunters.

A third method, which requires still more address, consists in enticing the elephant to pursue a mounted hunter on the open plain, while the huge pursuer is ham-stringed by a sabre cut inflicted by another hunter behind him.

One might infer from the previous summary of the present condition of the African elephant, as relates to man, that his disposition was naturally vicious, and rendered him incapable of domestication. But there is no real ground for such a conclusion. Were the Africans raised to the same degree of civilization as the Asiatics, there seems little doubt but that their species of elephant might be made equally useful in a state of servitude; for the specimen now living in the French national menagerie has not shown less intelligence than the Asiatic elephant. It has learnt the same tricks, and has performed the same motions and exercises, under the same circumstances, and in the same period of time. It is as affectionate to those who feed him, and as obedient to their commands.

The Carthaginians, moreover, employed elephants for all the purposes that they have served in other parts of the civilized world; and they must have derived their supply from the species under consideration.

Cuvier gives the following concise account of the ancient history of the elephant. "Homer speaks frequently of ivory, but knew not the animal whence it was derived. The first of the Greeks who saw the elephant were Alexander and his soldiers, when they fought with Porus; and they must have observed them well, for Aristotle gives a complete history of this animal, and much truer in its details than those of our moderns. After the death of Alexander, Antigonus possessed the greatest number of elephants. Pyrrhus first brought them into Italy 472 years after the foundation of Rome: they were disembarked at Tarentum. The Romans to whom these animals were entirely strange, gave them the name of Leucanian Bulls. Curius Dentatus, who captured four of these animals from Pyrrhus, brought them to Rome for the ceremony of his triumph. These were the first which were there exhibited, but after-

wards they became in some measure common. Metellus having vanquished the Carthaginians in Sicily, conducted their elephants to Rome on rafts, to the number of a hundred and twenty according to Seneca, of a hundred and forty-two according to Pliny. Claudius Pulcher had combats of the elephant in the circus in 655; and similar combats, either of elephant against elephant, of the elephant against the rhinoceros, the bull, or the gladiator, were exhibited by Lucullus, Pompey, Cæsar, Claudius, and Nero. Pompey harnessed them to his car during his triumph for Africa. Germanicus exhibited some which danced in a rude fashion. In the reign of Nero they were seen to dance on a rope, carrying at the same time a Roman knight. One may read in *Ælian* the extraordinary feats they were brought to execute. It is true they were trained to them from their earliest age, and *Ælian* says even, expressly, that these dancing elephants were brought forth at Rome. This assertion, with the confirmation it has received in our own day from the experiments of Mr. Corse, leads us to hope it will be possible to multiply this useful animal in a state of domestication."

SALMON-FISHING BY A DOG.

"Now that I am got upon the subject of fishing, let me tell you of an amusing instance of sagacity which I had an opportunity of seeing a short time ago, in a water-dog of this country, who had become a most excellent fisher. In riding from Portrush to the Giant's Causeway with some company, we had occasion to ford the river Bush, near the sea; and as the fishermen were going to haul their net, we stopped to see their success. As soon as the dog perceived the men to move, he instantly ran down the river, of his own accord, and took post in the middle of it, on some shallows, where he could occasionally run or swim, and in this position he placed himself with all the eagerness and attention so strongly observable in a pointer dog who sets his game. We were for some time at a loss to apprehend his scheme, but the event soon satisfied us, and amply justified the prudence of the animal; for the fish, when they feel the net, always endeavour to make directly out to sea. Accordingly, one of the salmon, escaping from the net, rushed down the stream with great velocity toward the ford, where the dog stood ready to receive him at an advantage. A very diverting chase now commenced, in which, from the shallowness of the water, we could discern the whole track of the fish, with all its rapid turnings and

windings. After a smart pursuit, the dog found himself left considerably behind, in consequence of the water deepening, by which he had been reduced to the necessity of swimming: But instead of following this desperate game any longer, he readily gave it over, and ran with all his speed directly down the river, till he was sure of being again to seaward of the salmon, where he took post as before in his pointer's attitude. Here the fish a second time met him, and a fresh pursuit ensued; in which, after various attempts, the salmon at last made its way out to sea, notwithstanding all the ingenious and vigorous exertions of its pursuer.

“Though the dog did not succeed at this time, yet I was informed that it was no unusual thing for him to run down his game; and the fishermen assured me that he was of very great advantage to them, by turning the salmon toward the net.”—*Hamilton's Letters on the Coast of Antrim*, 1790.

ON THE FASCINATING POWER OF SERPENTS.

THE following is an abstract of a paper by Dr. Barton, which appeared in the American Philosophical Transactions.

Every one is acquainted with the power ascribed to the rattle-snakes and other American serpents, of fascinating birds and small animals, such as the squirrel, and of depriving them of the power of escaping their magic influence; and which thus enables them to capture animals that otherwise would seem to have been placed entirely out of their reach. The unhappy animal is described as running up and down the tree, always going down more than it goes up, till at length it is drawn nearer to the snake, whose mouth is open to receive its victim. The poor little animal runs into the snake's jaws, uttering a piteous cry, and is immediately swallowed. This is the manner in which this fascinating power is exerted, as related by different authors. And this story has been repeated by naturalists in their histories of serpents. They seem credulously to have believed the accounts they received, and to have taken them for granted without sufficient examination. Linnæus says that this power was given to the rattle-snake as a compensation to it for the slowness of its motion. He seems to have received this tale from some of his pupils, and does not assert that he was ever the eye-witness of the fact. The existence of this power would be readily believed in by the uninformed, who always give credence to any tale of wonder.

Where this belief originated, is unknown. Perhaps some

traces of it may be discovered in the mythology of Asia and Africa. Some have referred it to the American Indians ; while others, who have travelled amongst them, never heard any mention of the circumstance, although they heard them praise the ingenuity of these reptiles in catching birds, squirrels, &c.

M. de la Cepede, in his *Histoire Naturelle des Serpents*, has paid great attention to this subject ; and he offers two suppositions for the explanation of this miraculous power. One is, that the pestiferous breath of the snake agitates the animal which it means to devour, and prevents its escape. Many persons assert that they never knew any disagreeable smell to proceed from these animals, even after they had been some time shut up in a box ; while others say that a very offensive stench is continually arising from the body of the rattle-snake. Some have ascribed the motions of the birds that are introduced into the cages of these animals to the effect of their breath ; but they were probably caused by fear. The rattle-snake has been known to continue for days coiled round a tree, in which the thrush or cat-bird were rearing their young, which, upon this supposition, must have perished. The other supposition is that these animals have been slightly bitten. But their actions are totally different from those observed in animals bitten by a rattle-snake ; besides that the agitation of the bird has ceased on the death of the snake. Nor is this power of fascination ascribed exclusively to the venomous serpents ; for almost every species is supposed to be endued with it. Blumenbach ascribes it to the rattle on the tail of the rattle-snake ; but this has been observed to be perfectly quiet at the time when the supposed charm is working : and this explanation cannot apply to the other snakes.

Hence it appears that none of these explanations are satisfactory. If we examine the species of birds that are generally observed to be enchanted, and the season when it takes place, we may perhaps arrive at a more probable solution of the problem.

Those birds that are led by instinct to build their nests on the ground, or on trees near the ground, have most frequently been observed to be under the enchanting influence of the rattle-snake ; for it is well known that each kind of bird builds its nest in the same situation, at least in any one particular country. Upon inquiry concerning the time of the year when any bird had been seen under this influence, it was found, in almost every instance, to be that at which it was either laying its eggs or rearing its young. From these considerations it appeared probable that the cries and fears of

birds, supposed to be fascinated, originated in an endeavour to protect their nest or young.

The rattle-snake does not climb trees ; but many other species do. When a bird sees its well-known enemy gliding up the tree to attack its nest and devour its young, it naturally endeavours to defend them ; and she attacks the snake with her wing, her beak, or her claws, and frequently drives it away, although sometimes she approaches so near as to fall a prey to her enemy. This contest is by no means so unequal as might be supposed. The bone on the top of the head of the rattle-snake is thin and brittle ; so much so that it is thought that a stroke from the wing of a thrush or robin would be sufficient to break it. A thrush was observed seated on the back of a large black snake, which it was pecking with its beak. The snake was in the act of swallowing a young bird ; and as soon as the snake was killed, the old bird flew away. The cries and actions of this bird exactly resembled those ascribed to fascination. The rattle-snake lives chiefly on the great frog (*Rana ocellata*), and birds are very rarely found in its stomach. Birds and squirrels are by no means the principal food of serpents ; and yet this influence is chiefly exerted upon them : so it can hardly be considered as designed to secure food for these reptiles. The black snake is often obliged to use great ingenuity to get at his food, which consists chiefly of eggs and young birds. If it possessed the power of fascination, it might secure for itself abundance of food, when the woods are swarming with birds, without having recourse to the artifice of suspending itself by its tail from a bough over a nest, the contents of which could not be reached by it in any other way.

[It seems strange that this extraordinary faculty should have been ascribed solely to these already formidable reptiles, when the cries of distress and the signs of alarm, which gave rise to the story, are really to be referred to the love of the mother for her young, and to the fear of death ; feelings which must be continually operating in every animal at the sight of another, whose appetite is to be satisfied only by her own destruction.

Fear sometimes entirely deprives an animal of the power of escape. I have seen a Spanish greyhound so overwhelmed with dread at the sight of a terrier, which was flying at it, that it appeared as if under the influence of fascination, stood perfectly still, neglecting its swiftness of foot, which would soon have placed it out of danger, and would have fallen a victim to its antagonist, had not the latter been arrested by the blow of a heavy stick.]—*From a Correspondent.*

We have inserted the foregoing abstract of Dr. Barton's paper, in the hope that some of our readers will favour us with their observations on this interesting subject. We cannot agree in all the conclusions drawn by the Doctor, and have reason to question the accuracy of some of his facts.—We are inclined to think that he has not dissected the head of a rattle-snake, or he would have discovered that the bone on the top of the head is not "so thin and brittle that it is thought that a stroke from the wing of a thrush or robin would be sufficient to break it." At the same time we must admit that there is considerable weight in the reasons he gives in support of his explanation of this singular supposed faculty.

EDITOR.

MEMOIR OF SIR JOSEPH BANKS.

WE propose occasionally to present our readers with short memoirs of the most distinguished naturalists, and of persons who have, either by their discoveries or their scientific attainments, made valuable additions to our knowledge of zoology, or have contributed to the advancement of any branch of natural history.

Foremost in the rank of such persons, we must place the subject of the present memoir, who may claim our attention not on any one of these grounds singly, but on all of them. He united a love of science with an earnest zeal and steady perseverance in its pursuit; an energetic and courageous disposition, combined with ample pecuniary resources, and the friendship and patronage of those in power, and thus possessed qualifications seldom met with in one individual.

These numerous advantages were well bestowed on Sir Joseph Banks. In all his undertakings the chief object he had in view was the general advancement of science, and particularly his favourite study, natural history. Totally free from all selfish feelings he seems ever to have considered his acquisitions and discoveries as public property; and his splendid library and magnificent collection of specimens and drawings were always at the service of scientific men. Indeed the unbounded generosity with which he communicated his treasures to those whom he considered would duly appreciate them, may be considered as a remarkable trait in his character.—But we feel that we are anticipating, and that we ought to state shortly, the history of this enterprising individual, before we offer any further remarks.

Sir Joseph Banks was born 13th December, 1743. Some doubt appears to exist as to the period at which his ancestors

(who are stated to have come originally from Sweden,) had been settled in this country. It seems, however, agreed, that his grandfather was a medical practitioner of some celebrity in Lincolnshire, and that he acquired a considerable fortune by his practice, and represented the city of Peterborough in one or two parliaments.

The subject of our present memoir was sent at an early age to Harrow, and from thence to Christ's College Oxford. His father dying in or before 1761, he was left at the age of eighteen, without restraint, with a handsome fortune at his own disposal. His principal estates were situated in Lincolnshire, and he devoted himself with great zeal to the improvement of this property, particularly in draining and embanking it.

Sir Joseph appears at an early age to have imbibed a taste for natural history. At first botany was his favourite pursuit, and he seems to have cultivated this study with a considerable degree of ardour. It is related that in the course of one of his botanical expeditions, when much fatigued he fell asleep, and was seized by police officers as a suspected person, and taken before a magistrate, who was not a little amused at the adventure.

In 1768 the scientific expedition under the command of Captain Cook was planned ; and although the chief object which the promoters (of whom George III. was the chief,) had in view was the advancement of geographical and astronomical knowledge, Sir Joseph Banks was anxious to avail himself of the opportunity of adding to the stores of natural history ; and, influenced by this motive, he resolved to accompany the expedition. Accordingly he made the most ample preparations, at his own expense, for the undertaking, and engaged Dr. Solander and other scientific persons to accompany him.

Most of our readers are no doubt acquainted with the interesting discoveries and amusing adventures which resulted from this expedition. Many will remember with what delight they first read the history of Captain Cook's voyages ; and throughout this history they will no doubt recollect the frequent and honourable mention of the subject of our present memoir, and the justly earned tribute paid to the great zeal and activity displayed by him throughout the progress of the voyage.

As might be expected, they met with many interesting adventures in the course of their travels. On the coast of Terra del Fuego Sir Joseph Banks and Dr. Solander narrowly escaped perishing in a storm of snow in which they were

compelled to pass the night on shore. A seaman and a black servant who accompanied them fell victims to the excessive fatigue and cold ; and it was with considerable difficulty that Dr. Solander was rescued from a similar fate. Indeed the ultimate escape and safety of the party was attributed to the energy and presence of mind which Sir Joseph displayed under the very trying circumstances in which they were placed.

In proceeding from thence, many valuable acquisitions were made of ornithological specimens, and it is particularly recorded that Sir Joseph Banks in the course of one day killed as many as sixty-two birds with his own hand, of which number a great proportion had till then been undescribed.

The expedition arrived at Otaheite in April 1769. They remained there three months, and Sir Joseph Banks, on account of his many useful and agreeable qualities, became a general favourite. His energetic character again displayed itself in many instances, particularly in recovering the quadrant which had been stolen by some of the natives, and the loss of which would have proved of very serious consequence to the main object of the expedition.

From Otaheite they proceeded to New Zealand, and to the eastern coast of New Holland, which they called New South Wales. The well known name of Botany Bay was also given by them, in consequence of the numerous botanical specimens collected there by Sir Joseph Banks and Dr. Solander. Whilst at New South Wales a very mortifying accident occurred, which destroyed a great part of the valuable and interesting collection, in obtaining which so much time and labour had been expended. The vessel struck upon a rock, and was considerably damaged ; and afterwards, whilst undergoing repair, still further mischief was occasioned by the rushing in of the sea. It may readily be conceived how acutely these disasters were felt by the subject of our present memoir.

The expedition afterwards sailed for New Guinea, and on their return touched at Batavia, where a great part of the crew perished from fever. In June 1771 the vessel arrived in the Downs, and Sir Joseph Banks was welcomed home by numerous friends and admirers of his public and scientific character. He received from all the celebrated literary characters, and from the public in general, the respect due to his talents and his energy.

Another expedition was projected under Captain Cook in 1772, in search of the Southern continent ; and Sir Joseph Banks made great preparations, and intended to have again

joined the party, but owing to circumstances connected with the vessel, he altered his determination, and did not accompany the expedition. His active mind could not, however, remain long unemployed, and he determined on a voyage to Iceland and the Western Islands of Scotland, as well for the purpose of making scientific researches as of giving employment to those persons whom he had engaged under the expectation of joining the expedition under Captain Cook last alluded to. In the course of this voyage Sir Joseph Banks visited Staffa, and explored the Cave of Fingal (then almost unknown), and other curiosities. On reaching Iceland they commenced their researches, and made many valuable additions to what was then known of the products of this island. They also reached the summit of Mount Hecla, after an arduous journey of twelve days.

After the return of Sir Joseph Banks from this expedition he did not again leave his native shore, but continued to reside at home, extending his valuable collection of specimens in all the branches of natural history, and applying his scientific and experienced mind to a variety of subjects connected with his favourite study. His house became the general resort for scientific characters from all countries, and he himself was visited by persons of all ranks.

In 1777, on the retirement of Sir John Pringle, Sir Joseph Banks was appointed President of the Royal Society. That he was qualified to fill this important station seems to have been generally admitted ; and although it would show a want of candour and impartiality if we did not state, that some faults were occasionally discovered in the conduct of Sir Joseph as President, yet upon the whole we believe we are justified in saying, that he presided over this learned Society with great credit to himself, and great advantage to the institution.

It was not until 1781 that he was created a baronet. We have been therefore rather inaccurate in speaking of him as Sir Joseph Banks prior to this period. He was subsequently created a Knight of the Bath. He took an active part in the foundation of the African Association, and was also one of the chief promoters or founders of the Horticultural Society.

He died 19th May, 1820, at his house in Soho Square, having bequeathed his valuable museum for the benefit of his country, and which now forms a valuable part of the British Museum.

CLEARNESS OF THE SEA AT THE NORTH CAPE.

THE following interesting description of the appearance of the Northern Sea is given by Capell Brooke, in his Travels to the North Cape.

“ Nothing can be more surprising and beautiful than the singular clearness of the water of the northern seas. As we passed slowly over the surface, the bottom, which was in general a white sand, was clearly visible, with its minutest objects, where the depth was from twenty to twenty-five fathoms. During the whole course of the tour I made, nothing appeared to me so extraordinary as the inmost recesses of the deep thus unveiled to the eye. The surface of the ocean was unruffled by the slightest breeze, and the gentle splashing of the oars scarcely disturbed it. Hanging over the gunwale of the boat with wonder and delight, I gazed on the slowly moving scene below. Where the bottom was sandy, the different kinds of *Asteriæ* and *Echini*, and even the smallest shells, appeared at that great depth conspicuous to the eye ; and the water seemed in some measure to have the effect of a magnifier, by enlarging the objects like a telescope, and bringing them nearer. Now creeping along, we saw, far beneath, the rugged sides of a mountain rising towards our boat, the base of which perhaps was hidden some miles in the great depth below. Though moving on a level surface, it seemed almost as if we were ascending the height under us ; and when we passed over its summit, which rose in appearance to within a few feet of our boat, and came again to the descent, which on this side was suddenly perpendicular, and overlooking a watery gulf, as we pushed gently over the last part of it, it seemed almost as if we had thrown ourselves down this precipice ; the illusion, from the crystal clearness of the deep, actually producing a sudden start. Now we came again to a plain ; and passed slowly over the submarine forests and meadows which appeared in the expanse below, inhabited, doubtless, by thousands of animals unknown to man ; and I could sometimes observe large fishes of a singular shape gliding softly through the watery thickets, unconscious of what was moving above them. As we proceeded the bottom became no longer visible : its fairy scenes gradually faded to the view, and were lost in the dark green depths of the ocean.”

THE ZOOLOGICAL GARDENS.

ALTHOUGH the Gardens at this season of the year do not present such numerous inducements to strangers, as in spring or summer, when the ride or walk, and the choice collection of plants and flowers with which they are ornamented, are of themselves sufficient to gratify the visitor, yet some of the animals are now to be seen to great advantage, and many persons have availed themselves of the mild and dry weather during the past month to pay them a visit.

Some valuable donations have been added to the collection at the Regent's Park; including a pair of chetahs from India, presented by Lord Clare; a South American ostrich, from the President, Lord Stanley; and a number of golden pheasants from J. Fuller, Esq.

Workmen are now engaged in inclosing and fencing a part of the land lately added to these gardens on the east side, and we understand a bank is to be formed and planted for the purpose of sheltering the grounds, as much as possible, from the east wind. From the Report read at the last monthly meeting, it would appear that the Council do not contemplate the erection of any buildings on the newly inclosed land at present, but intend forming two large ponds or reservoirs, one of which is to be appropriated to the use of those beautiful birds the mandarin ducks; and the other for the rest of the aquatic birds.

The members of this Society held their first scientific meeting on the evening of the 8th of January. It is intended to continue these meetings at intervals of a fortnight, and to publish occasionally the papers read, and other scientific information obtained, in the shape of Transactions, similar to those of other Societies. At the first meeting, papers were read and observations made by Mr. Bennett, the intelligent Vice-Secretary of the Society, Mr. Yarréll, Dr. Grant, and others. We shall probably in future give a short account of the proceedings of these meetings, which, we trust, will be acceptable to many of our readers.

Dr. Grant has commenced a course of lectures to the members on Zoology, which, as far as they have proceeded, have been well attended, and have given great satisfaction.

We hear favourable accounts of the Surrey Gardens, and that some valuable additions are likely to be made in the course of the spring. We must, however, candidly admit that we have not visited these gardens during the past month, and can therefore only promise to furnish all the information we can procure against our next Number.

ON THE PANTHER.

To the Editor of the *Zoological Magazine*.

SIR,

PERHAPS you can find room in your next Number, or in the Notices to Correspondents, to give me some light on the following subject.

In Pennant, Buffon, and all the old books of natural history, the panther is universally described as a beast larger than the leopard, and differing from him by having a single spot in the centre of the rings on his body, while the leopard has only the rings. Now in the Zoological Gardens there is a beast which they call the panther, larger indeed than the leopard, but having neither rings, nor rings with central spots, but only single spots like the chetah. To complete this riddle, the author of the "Tower Menagerie" asserts that there is no such existing beast as the panther. If you can solve this Gordian knot, you will greatly oblige

FELIS.

Though we are not vain enough to undertake to solve a Gordian knot, we gladly give our correspondent "Felis" such information as we possess on the subject. We must observe that in the present state of knowledge relative to these two species, very little dependence can be placed on characters drawn from the markings and spots on the skin. The single spot in the middle of the ring (*ocellus pupillatus*) attributed to the panther by Buffon, is an error arising from his having been ignorant of the country from which was derived the large spotted *Felis*, figured as the female panther at pl. xii. vol. ix. of the quarto edition of his Works. This animal is the American Jaguar.

Our correspondent would be equally mistaken in supposing the fine single-spotted *Felis* ticketed 'Panther' in the Zoological Gardens, to be the type of that species. It is either a variety merely, or a species distinct from both the leopard and panther. But the determination of this question will require more minute investigation than is practicable on the living animal.

According to the investigation of Temminck, the panther (*Felis Pardus*) is larger than the leopard, and its tail equals in length the body and head, and contains twenty-eight vertebræ; while in the leopard, the tail is equal in length to the trunk only, and contains twenty-two vertebræ. Both the species have the spots on the sides of the body arranged in rings, which are broader in the leopard than in the panther.

These rings contain occasionally a central spot like the Jaguars, but are more commonly without, (*ocelli cæci*). They are never so broad as in the jaguar. Linnaeus was of opinion that the leopard and panther were varieties of the same species.—EDITOR.

THE CUCKOO.

To the Editor of the Zoological Magazine.

SIR,

I HAVE read with great interest the communication of your correspondent W. C., describing the manner in which the young cuckoo refuses to labour for its own support, as long as it can force any other bird to supply it with food; as well as the attention which the smaller birds pay to its cry for help. I have seen an account of a similar occurrence between a cuckoo and a thrush, which were put into the same cage, the latter undertaking to feed the former. The cuckoo had been taken out of a hedge-sparrow's nest. These birds were in the possession of Gideon Mantell, Esq. of Lewes. The following extract from the Introduction to Sweet's British Warblers rather confirms his supposition that migratory birds, detained in this country beyond the time appointed for their departure, feel, in captivity, the same impulse which, in a state of liberty, would have carried them to far distant lands.

“These birds, when in confinement, are very restless at the seasons of their usual migration from one country to another,—at the time that they are leaving this country in autumn, about twice during the winter, and again when they are returning in the spring. From their agitation at various times in the winter, it may be concluded that they visit more than one country after their departure from this. It is very curious to see them when in that state; their restlessness seems to come on them all at once; and generally in the evening, when they are sitting, seemingly quite composed, they start up suddenly and flutter their wings; sometimes flying direct to the top of the cage or aviary; at other times running backwards and forwards on their perches, continually flapping their wings, and looking upward all the time: nor will they notice anything that is going forward as long as they continue in that state, which lasts for an hour or two at each time. By their always wishing to fly upwards, it may be supposed that when they take their flight, they mount to a great height, so that they can direct their course the

better by seeing the way clear all around them: their agitation generally lasts on them about a fortnight; sometimes more, and sometimes less: in the spring it seems strongest on them; at that season they will sometimes flutter about the whole of the night, and sleep a great part of the day."

Perhaps your correspondent may, during his observations on this singular bird, have discovered some explanation of the curious fact mentioned by Prof. Rennie, in his edition of Montagu's Ornithological Dictionary,—that, in many instances, the female cuckoo cannot possibly have sat upon the nest so as to have deposited her egg therein in the ordinary manner. According to Le Vaillant one of the African cuckoos places its egg in the nest with its bill. Audubon says, in his account of the Chuck-Will's-Widow (*Caprimulgus Carolinensis*), that if its eggs are disturbed it immediately transports them in its mouth to some other spot. He was himself once a witness of this fact. This evidence proves that birds do sometimes remove their eggs in this manner.

M.

ZOOLOGIST'S CALENDAR FOR FEBRUARY.

QUADRUPEDS.—Several species of Bats (*Plecotus auritus*, *Vespertilio murinus*, &c.) begin to revive from their torpid state. The Mole (*Talpa europea*) makes a nest chiefly composed of moss.

BIRDS.—The Rook (*Corvus frugilegus*) and the Raven (*Corvus Corax*) begin to build. The Goldfinch (*Fringilla Carduelis*), the Yellow-hammer (*Emberiza Citrinella*), the Sky-lark (*Alauda arvensis*), the Chaffinch (*Fringilla cælebs*), all improve considerably in song. Partridges (*Perdix cinerea*) pair. Hens (*Phasianus Gallus*) sit. House Pigeons (*Columba domestica*) breed. Missel Thrushes pair.

INSECTS, &c.—The following may be occasionally met with in the course of this month. Brimstone Butterfly (*Papilio Rhamni*), the Primrose Butterfly (*Gonopteryx Rhumni*), the February Carpet Moth (*Aplocera cæsiata*), the Spring Usher Moth (*Anisopteryx leucophearia*), the Meal Worm Beetle (*Tenebrio Molitor*), the Bacon Beetle (*Dermestes lardarius*), and the Ditch Beetle (*Hydrophilus caraboides*).





THE POLAR BEAR.

THE
ZOOLOGICAL MAGAZINE.

THE POLAR BEAR. (*Ursus maritimus*, Pallas.)

THE quadrupeds whose extremities are terminated by claws, and whose jaws are armed with the three kinds of teeth, viz. *molares*, *laniarii*, and *incisores*,—or grinders, lacerators, and cutters,—are for the most part driven by an innate ferocity of disposition to prey upon and destroy those animals which these natural weapons enable them to overcome.

The carnivorous propensity, however, exists among them in different degrees. In some of the genera it can only be satiated with blood, and is active as long as any prey can be procured: but these wholesale destroyers are happily the smallest and weakest of the order *Ferae*. The larger and more formidable species again, as those of the Feline tribe, are limited in their geographical range, rarely extending beyond the tropics; they also devour the whole of their prey except the bones, and their hunger is accordingly satisfied with fewer victims than that of the insatiable weasel-tribe. At length the tendency to destroy ceases to be a prominent feature; and this we find to be the widely distributed genus to which our present subject appertains, which embraces the largest and most indomitable animals of the order.

Bears have in fact their molar or back teeth so constructed as to be better fitted for bruizing and masticating vegetable substances, than for cutting or dividing the raw fibres of an animal's flesh: instead of sloping to an edge, as in the Feline tribe, and sliding upon those of the opposite jaw like the blades of a pair of scissors, these teeth have broad tuberculated surfaces, and are opposed crown to crown. Accordingly it is observed that by far the greater number of the species derive their sustenance from the vegetable kingdom.

The general form of the body corresponds to this destination, and is better adapted for digging and climbing than for executing those agile movements by which the more carnivorous tribes capture their living prey. Thus, instead of stealing lightly and softly on the extremities of the toes, the whole foot in both the fore and hind legs is applied to the ground*; and as the claws of the bear have no provision for retraction, their gait is frequently accompanied by a disagreeable clatter, very different from the noiseless tread of the cat.

* The tribe to which the bear belongs is called 'plantigrade.'

Nevertheless the bears still possess formidable destructive weapons ; their jaws are actuated by powerful muscles, and are both armed in front with six incisors and two large pointed conical teeth, or laniaries. Their claws, although not indeed so sharp as in the tiger, are yet sufficiently capable, from the great power of the limbs, of inflicting severe lacerations : and the irresistible gripe of these animals,—their favourite and almost peculiar method of attack,—is proverbial. The courage of the bear corresponds with his corporeal powers ; and although he avoids a rencontre with man, and exercises considerable caution under circumstances not familiar to him, and from which danger might be apprehended, yet when compelled to fight, he becomes a formidable opponent, bringing his forces into the field with good-will and energy, and losing none of his natural advantages through fear.

Possessing an internal organization capable of digesting either animal or vegetable food, and locomotive powers adapted to a vast variety of circumstances, it may be readily supposed that the animals of the genus *Ursus* are widely distributed over the face of the globe. Indeed it will be difficult to point out any other group in the class *Mammalia*, inferior to man, so truly cosmopolite. Accordingly species of the bear, differing but little from each other in general form, are met with from the equator to the pole : and, notwithstanding the organized products which characterize these latitudes are of a nature so widely different, the bear contrives in both climates to satisfy his voracious appetite and grow fat.

In the arctic regions, where the vegetable kingdom is feebly represented by lichens and mosses, but where, on the contrary, the ocean teems with myriads of small mollusca, and at the same time exhibits animal life under its bulkiest forms,—here the polar bear is found laying wait for and combating the walrus and the seal; pursuing and overtaking in its own element the swift salmon ; employing stratagem to surprise the smaller quadrupeds and birds which in summer-time visit the higher latitudes ; less delicate also in his appetites than the more strictly carnivorous quadrupeds, this species does not disdain to feast on the stranded carcase of the whale ; and being of a slothful disposition, he prefers this more easy and abundant sustenance to that which demands from him more active predatory exertions.

In the tropical regions, on the contrary, where vegetation is exhibited under the most luxuriant forms and in the greatest profusion, the bears live almost exclusively on vegetable matter ; and it is interesting to observe that these species are the smallest of the genus, and are consequently best fitted

for climbing; whilst the bears inhabiting the wilds of Siberia, the Rocky Mountains of North America, and the arctic ice-bergs, attain that superior size and strength which enable them to execute the acts of destruction necessary for their own support and existence.

Besides differences in size and colour, there are few characteristics by which the species can be distinguished from each other; and these marks of distinction are by no means prominent or easily perceived. Linnaeus, who had never had an opportunity of examining the polar bear, doubted even its specific difference from the brown bear, which consequently was the only one admitted into his catalogue of species. It is true he has characterized in his last edition of the *Systema Naturæ* four species of *Ursus*; but then he associated in the same genus with the common bear, the badger, the racoons, and the glutton, all of which, possessing fewer teeth and longer tails, have been separated from the genus *Ursus* in the modern systems of zoology. In the same year that Storr effected this dismemberment, Pallas added two species to the restricted group, and satisfactorily pointed out the characters which distinguish the polar and the American black bear from the European species.

Soon afterwards a new era arose in natural history, when the knowledge of living species was found essential to the elucidation of those numerous extinct forms of which the fossil remains now alone exist; and it may be readily conceived what rapid strides the natural history of living animals has made, since to its own intrinsic attractions has been added the stimulus of a new and deeply interesting inquiry. Thus the immortal Cuvier observes, "From the commencement of my researches on the cave-bones, I perceived the necessity of determining the characters, as well external as osteological, of the living species of bears; and I made efforts to obtain the means. We possessed in our Museum but one skeleton of a bear, of an undetermined species. I was then obliged for many years to examine all the bears that I could procure, and to have their skeletons prepared. Our menagerie has in this respect been to me of the greatest utility; and on this, as on many other occasions, the scientific importance of such an establishment has been demonstrated." His own zeal and industry were met with corresponding ardour by his pupils abroad, and by scientific men of all nations; and the catalogue of species has accordingly been rapidly extended. They may be thus enumerated:—

Bears of Europe.

1. The Common or Brown Bear ; *Ursus Arctos*, Linn.
2. The Pyrenean Bear, or Bear of the Asturias ; *Ursus pyrenaeus*, F. Cuv. ?
3. The Norwegian Bear ; *Ursus norvegicus*, F. Cuv. ?

Bears of Asia.

4. The Siberian Bear ; *Ursus collaris*, F. Cuv. ?
5. The Labiated Bear ; *Ursus labiatus*, Blainville.
6. The Malayan Bear ; *Ursus malayanus*, Raffles.
7. The Thibetan Bear ; *Ursus thibetanus*, Cuv.
8. The Bornean Bear ; *Ursus eurispylus*, Horsfield.
9. The Isabelline Bear ; *Ursus isabellinus*, Horsfield.
10. The Syrian Bear * ; *Ursus syriacus*, Hemprich.

Bears of Africa.

11. The Abyssinian Bear ; *Ursus habessinicus*, Hemprich. ?

Bears of America.

12. The Spectacled Bear ; *Ursus ornatus*, F. Cuv.
13. The Grisly Bear ; *Ursus ferox*, Lewis and Clarke.
14. The Black Bear ; *Ursus americanus*, Pallas.
15. The Polar Bear ; *Ursus maritimus*, Pallas.

Those of the above species which are denoted by a mark of interrogation require additional investigation and further opportunities of comparison, before they can be admitted as species unquestionably distinct. Numbers 2, 3, and 4, may ultimately be found to be varieties only of the common European Brown Bear.

Numbers 5 to 9 have been grouped together under the subgeneric titles *Prochilus* and *Helaretos*, or Sun-bears, having some characteristics in common, in which they differ from the rest of the genus. The species 11 has only been seen in its wild state, and has not yet been scientifically described : it is inserted here chiefly on account of its geographical position, being the only species of bear recorded with any degree of authenticity as inhabiting the continent of Africa.

As there is no genus of carnivorous quadrupeds in which the species present so few deviations from the common type, so are there none in which the differences of size are

* This, in all probability, was the species of bear which, as an instrument of Divine displeasure, tore the children that on Mount Bethel scoffed at the Prophet Elisha : see 2nd Kings, ii. 23, 24.

so slight. The Zoological Gardens at present contain the largest and perhaps the smallest species of Bear ; viz. the Grisly Bear, and the Malayan Bear ; in this menagerie may also be seen and compared together the species 1, 5, 12, 13, 14, and 15, of the above catalogue ; besides a brown or chestnut variety of the *Ursus americanus*, called the Cinnamom Bear. In all these species it may be observed that the body is heavy and ungainly, the limbs short and strong, each terminated by five toes, and armed with long curved unretractile claws ; their ears are short, and hairy both within and without ; their body is in most of the species covered with long shaggy hair, by which the tail is almost concealed. The habits of the different species differ almost as little as their forms, and were consequently nearly as well known 2500 years ago, when studied in the common European species, as at the present day.

Thus Aristotle observes, “ But the bear is omnivorous ; for it eats the fruits of trees, which, through the pliability of its body, it climbs. It also eats leguminous fruits. Destroying likewise the hives of bees, it eats their honey, and feeds on crabs and ants, and is carnivorous ; for on account of its strength this animal not only attacks stags, but also wild-boars, if it can invade them latently. It likewise attacks bulls : for attacking the bull in front, he falls on his back, and while the bull endeavours to strike him (as he lies in this supine position), the bear throws his arms round the horns of the bull, bites his shoulder, and lays him prostrate. For a short time, likewise, the bear walks erect on two feet, and eats every kind of flesh, previously masticating it.”—Book viii. chap. 5 : and again in chap. 17,—“ Among viviparous quadrupeds, also, porcupines and bears hide themselves. That savage bears, therefore, hide themselves is evident ; but it is dubious whether it is from cold, or some other cause : for both the males and females become about this time very fat, so as to be unwieldly. The female also brings forth at this season, and conceals herself till the period arrives of leading forth the young bears from her retreat : but she does this in the spring, and in the third month after the winter solstice. The bear likewise is concealed for about forty days at least ; and it is said, that for fourteen of these days it does not move at all, but in most of the days after these it is concealed indeed, yet is in a vigilant state, and in motion. A pregnant bear, however, has either never been caught by any one or by very few.. It is evident, also, that the bear during the time of its concealment does not eat anything ; for it does not come forth from its retreat ; but

when it is caught, both its stomach and intestines are found to be empty."—*History of Animals (Taylor's Translation)*. Modern observers have added little of importance to the preceding brief summary of the habits of the bear. The same uncertainty still prevails as to the duration, or even the fact, of its torpidity. Nay, almost the very words of the Greek philosopher respecting the pregnant European bear have been applied to the black bear of America; and with every appearance of being an original observation. "The bears are very common in this province (North Carolina), though not quite so large as in more northerly climates, such as Greenland and Russia. Their flesh is good and nourishing, not inferior to the best pork in taste, and is betwixt beef and pork. The young cubs are a most delicious dish, as most of the planters testify. . . . These beasts feed upon all manner of wild fruits, and are great devourers of every sort of fish, especially herrings, which they catch at the brook's side in the months of March and April. The flesh of those bears that feed upon them, is not good at that season, and eats filthily; neither are they good when they feed upon green berries. They are great devourers of swine that they take in the woods, especially when they are hungry and can get no other food, which is the only flesh meat they are fond of. They sometimes get into the Indian corn-fields or maize, where they generally spoil ten times more than they eat; they are so fond of the potatoes of this country, that they seldom fail to destroy and root out all clean, whenever they chance to come where they are. . . . Notwithstanding they seem to be such a clumsy creature, yet they will nimbly climb trees when pursued by hunters and dogs, where they generally remain till shot; and it is strange to see with what agility they will go up and down the trees, and in coming down they always run tail foremost. They are likewise very dexterous and expert in fishing, catching vast quantities of several sorts of fish as they run up the narrow creeks and shallow waters to spawn. There you shall see these beasts sit and take up fish as fast as it is possible for them to dip their paws into the water. There is one thing very strange and remarkable of this creature, which is, that no man, either Christian or Indian, ever killed a she-bear with young. It is most certain that they hide themselves in the most secret places, otherwise the Indians, who constantly hunt in the woods and kill thousands of he-ones, would at some time or other have found them."—*Bricknell's Natural History of North Carolina*, p. 110.

The obscurity which so long prevailed respecting the gesta-

tion of the bear, in consequence of the extreme caution which the female practises in selecting her retreat, has been in a great measure dissipated by the circumstance of the American black bear having bred in the Parisian menagerie. Gestation lasts seven months, and the young ones are brought forth in January ; they are entirely grey, and without the white collar which characterizes the young of the European brown bear. The period, therefore, which Aristotle has assigned to the latter species, of thirty days, is evidently erroneous.

With respect to the intellectual faculties of the bear, it has been stated by the naturalist who has been most happy in observations of this kind, that “prudence is the principal trait in the character of the bear ; circumspection cannot be carried beyond the degree in which he manifests it : he recedes, whenever he is able, from everything unfamiliar to him ; if he is compelled to approach it, he does it slowly, calling in aid all his methods of exploration, and he does not advance until he has become fully assured that the object of his alarm is without danger for him. It is not, however, resolution nor courage that he wants ; he seems little susceptible of fear ; he is not seen to fly ; confident in himself, he resists a threatened injury, opposes force to force, and his rage as well as his exertions may become terrible if his life is threatened. But it is especially in defence of their young, that the female bears put forth all the resources of their muscular energies and of their courage : they throw themselves with fury upon every living creature that excites their alarm, and only cease to combat when they cease to exist.

“What adds in some measure to the merit of their prudence and courage is the singular extent of their intelligence, which seems to take away whatever of a blind mechanical character might be considered to appertain to their other qualities. We know the education which the bears receive from those men who get their living by leading these animals from town to town, and making them perform clumsy dances to the sound of a flageolet ; and we can conceive that by means of chastisements and rewards, whilst the animal is compelled to assume the necessary attitudes, that they at length succeed in making him repeat them by word of command. It is by means of these associations that even the most stupid animals can in some degree be instructed. But we have witnessed in many species of bears an education, which was effected freely and by themselves, produce more remarkable results than the compulsory tuition of which we before knew them to be susceptible. We have observed this in the bears which live in the pits of our menagerie, and are influenced only by the

public, who speak to them and give them dainties. Through the influence of these two means alone these animals have learnt to perform a number of exercises, which they repeat at the simple word of command, and under the sole expectation of being rewarded by a cake or an apple. Thus at the words *mont' à l'arbre*, they climb the trunk of the tree which is placed in their pit. If one says to them *fais le beau*, they know that they ought to lie down on their back, and bring together their four paws. At the word *priez*, they sit up erect and join their fore legs. At the word *tourne*, they pirouette upon their hind legs, &c."—F. Cuvier, *Dict. des Sciences Nat.*

It has been observed, that the black bears of America profit less by this sort of public education than their European congeners, and it is remarkable that the form of their head presents a less intellectual character.—The polar bear, to the particular history of which we shall now turn, presents a still less degree of docility and intelligence.

This species ranks among the larger productions of the animated creation; but it must be observed that in the accounts of the older navigators its size has been greatly exaggerated. Those seen by the naturalists who accompanied Captain Parry in the northern expeditions, did not in general exceed seven or eight feet in length. Captain Lyon has given the dimensions of one which was considered to be unusually large, being 8 feet $7\frac{1}{2}$ inches long, and weighing 1600lbs. A female, which was attended by two cubs, was killed on the 31st of August, 1822, and was so small that two or three men were able to lift her into a boat; yet she must have attained the period at which she was capable of propagating her kind on or before the autumn of the preceding year."—*Appendix to Parry's Second Voyage*, p. 288.

With the exception of the naked end of the snout, the lips, the margins of the eyelids and the claws, the exterior of the polar bear presents at all seasons of the year an uniform white colour; a provision which renders its movements less easily distinguishable either by its enemies or its prey in the snowy regions destined for its habitual abode. The parts above mentioned are of a black colour; the lips have a purple tinge; the tongue is black, and the whole inside of the mouth is of a pale violet hue. As the polar bear advances in age it acquires a yellowish tint, and the forehead of the old animals is generally devoid of hair, and of a brown colour, a consequence of a remarkable habit this species has of rubbing that part of the head with a swinging circular motion against any hard perpendicular surface.

In shape the polar bear deviates more than any of the species from the generic type. It stands lower on the limbs, which are very strong and thick; the body seems consequently longer in proportion, but it is the neck and head that more especially possess this elongated character. The latter is narrow and tapering, and its contour presents a continuous line without that separation of the forehead from the muzzle which we observe in the brown bear. The projecting eyebrows are a peculiar character in the white bear. The eyes have the disproportionate smallness common to the genus; but the ears are much shorter than in the land bears, and thus form as slight an obstacle as possible while diving. The feet are remarkably long and broad; the toes united by a strong web as far as the roots of the nails: these are of a compressed form, and very strong, but shorter, perhaps, than in any other species. The polar bear can thus steal silently on its prey; and while a noiseless tread is further ensured by the hairy nature of the soles of the feet, this structure at the same time ensures him a firmer footing on the ice.

The hair on the head is very short and close-set; it becomes longer about the occiput and cheeks; upon the body it becomes still longer and shaggy, hanging down from the sides so as almost to hide the legs, and quite concealing the short tail behind. The longer hairs are intermixed at their roots with a very fine white wool or fur.

In considering the habits of this species of quadruped, we cannot avoid, in the first place, being struck with the remarkable geographical position in which nature has placed it. Animals in general, like plants, avoid extreme cold, rather than extreme heat: and though in consequence of being endowed with higher powers, their distribution over the globe is not regulated so absolutely by temperature as vegetables, yet they are considerably influenced by it. It is interesting, indeed, to observe the various modes in which they evade the influence of cold; some escape by migrating to warmer climates; others pass into a state of torpidity, previously placing themselves beyond the influence of low temperature either by surrounding themselves with substances that are bad conductors of heat, burrowing into the earth, or submerging beneath water. But with the present animal, heat seems the chief annoyance, and cold his greatest luxury. He is, however, stated by some to pass the dreariest period of the arctic winter in a torpid state, sheltered from the intense cold by the snow that has accumulated upon him. But, as we have before observed with respect to the common bear, some doubt also exists as to

whether the polar bear hibernates, or not. Dr. Richardson observes, "Our navigators confirm the statements of Fabricius and Hearne, that the polar bear does not hibernate, having occasionally seen them in the winter, and actually pursued one in December. It is mentioned in the narrative, that the Esquimaux killed eight or ten in the winter of 1822; and Mr. Edwards learnt from the hunters that they often saw and killed the males when roaming at large during that season, and as often dug the dams with their cubs from under the snow. These facts seem conclusive as to the uniform hibernation of the gravid females, and the, at least, occasional appearance of the males abroad in the winter. It is possible, however, that the latter may also become torpid in the winter, when the local circumstances of their native districts are such as to preclude them from reaching open water at that season; and thus the opposite opinions of naturalists may be in some degree reconciled."—*Appendix to Parry's Second Voyage*, p. 229.

It is at the decline of winter that the polar bears, and especially the females, are the fiercest and most formidable. At this period the stores of fat accumulated in autumn have become exhausted, and the maternal cares combining with hunger render the dam remarkably bold. They are rarely, however, the aggressors; but become furious when attacked.

The Siberian hunters, however, assured Pallas that the polar bear was more easily killed than the land bear, rarely surviving two body wounds. "The weak and ill-armed natives of those parts," he observes, "do not fear to enter into single combat with this powerful and generally dreaded beast, and for the most part come off conquerors. Armed only with a rude spear, they provoke their antagonist; and whilst he rushes madly forward to the attack, they slip with agility to one side and pierce him in the flank; for the bear sees nothing but what is straight before him, and passes blindly beyond his aggressor; which has been unaptly attributed to the celerity of his onset. But if he is beset with dogs, he heeds not the hunter, and consequently gives him ample opportunity to wound him from behind or on one side. And thus the Jacuti attack him with great safety, first setting on him a number of dogs; and they dread the polar bear much less than the brown bear. Thus in this unequal conflict the Siberian hunters, who are terrified by the first discharge of fire-arms as much as the American Indians, far exceed the Europeans in boldness and agility; for though the latter fearlessly stand in the ranks and brave the blind fortune of war, yet which of these heroes would venture singly to attack the

bear, armed with a simple lance?" Pallas takes notice of an assertion respecting the ease with which the polar bear, like the seal, may be killed by a blow on the nose; and he observes that a young animal which he kept alive during one winter, was quickly enraged by slight blows on the muzzle, and would then cover the injured part with his hand, or even hide his head with both his fore-feet: but he quotes a statement of Marten's, to the effect that the polar bear will sustain severe wounds on the head without fatal injury: and in the specimen now alive at the Zoological Gardens there may be observed a cicatrix on one side of the muzzle, which is apparently the effect of a severe blow. Pallas's young bear was exceedingly impatient at being touched about the ears or tail. He seemed a dull sluggish animal except when irritated; then, as if by a sudden impulse, he exhibited most prompt but confused motions, standing erect on his hind feet, and attempting to tear with his teeth. When threatened, he snarled with a hissing noise and a fierce expression of the eyes. When enraged and in combat, or unwillingly dragged by his chain, he uttered a graver and louder roar, but never howled like the common bear: he preferred fish and frozen meat to fresh meat,—holding this food between his feet upon the ground as he tore it. He never refused, however, any carcase; and the Dutch observed the polar bears devouring the bodies of their own species that had been slain. But he ate sparingly and not greedily, licking his food a long time. For drink he swallowed snow in large quantities and with great avidity, and lapped water. He swallowed also hay and straw, which was afterwards found in a small quantity quite undigested in his stomach. When sleeping, he generally covered his nose with his right paw; and seemed most lively when the cold was most intense. From Pallas's observation respecting the condition of the vegetable substances in the stomach of his bear, it might be supposed that this species was purely carnivorous; but it must be remembered that these substances were of the most undigestible nature. In the Parisian menagerie a polar bear was fed on bread only, consuming six pounds in the day; and after subsisting on this diet five years, it was nevertheless found extremely fat.

In its choice of habitation the polar bear differs most from the rest of the species. Instead of seeking concealment in the depths of forests, it prefers the floating iceberg and the open sea, its powers of swimming peculiarly adapting it to that sphere of existence. It rarely frequents the coasts of the Frozen Ocean, and does not descend to the eastern bound-

ary of Siberia, nor to Kamschatka: and although it is met with on the north coast of America and in Hudson's Bay, it does not inhabit the islands between America and Siberia. They resort to Spitzbergen in great numbers, and sometimes are transported on the ice to the coasts of Iceland and Norway; but the inhabitants of these places destroy them as soon as they are detected. The part of Siberia where they are found to be most numerous is at the mouths of the rivers Lena and Janissea.

The females go with young six or seven months, and are supposed to bring forth in the month of March. The number of their young is generally two, which follow their dam everywhere, subsisting on her milk until the winter that succeeds their birth. It is said that the mother carries them on her back when she swims from iceberg to iceberg. Nothing precisely is known of the longevity of the polar bear. It is hunted principally for its hide and fur, which from the softness of its texture is more esteemed than that of the brown bear.

BARON HUMBOLDT'S DESCRIPTION OF THE MODE OF CATCHING THE GYMNOTUS, OR ELECTRICAL EEL.

WHILE traversing the immense plains of the province of Caraccas, in order to embark at St. Fernando de Apure, and commence our voyage on the Orinoco, we stayed five days at Calabozo, a small town situated, according to my observations, in $8^{\circ} 56' 56''$ north latitude. The object of this visit was to study the electric eels (*Gymnoti*), an innumerable quantity of which are found in the neighbourhood. Indeed I was assured, that near Urituca a road, once much frequented, had been entirely abandoned on account of these electric fishes; travellers being obliged to ford a stream in which a number of mules were annually drowned, stunned by the shocks they received from the *Gymnoti*.

In order to perform our experiments with more precision, we were desirous of having the electric eels in the house which we inhabited at Calabozo. Our host took all possible pains to gratify our desires. He sent Indians on horseback to fish in the pools. It was easy enough to procure plenty of dead *Gymnoti*; but an almost puerile fear prevented the natives from bringing them alive. We were afterwards, it is true, convinced of the difficulty of handling this fish whilst it still retained all its powers: but the dread of the common people

is the more extraordinary in these countries, as they pretend that any one with tobacco in his mouth may touch a *gymnotus* with impunity. If the Indian had full confidence in this preservative, which is altogether false, why did he not avail himself of it to gain the ten francs which we had promised for every living electric eel that was brought to us? The love of the marvellous is so great among the natives, that they often maintain and spread abroad as facts what they themselves are far from putting faith in. It is thus that man thinks he must needs add to the wonders of Nature, as if Nature was not of herself sufficiently mysterious, grand and imposing.

After three days of fruitless attempts in the town of Calabozo, during which we received only one eel alive, and that in a very weak state, we resolved to transport ourselves to the spot, and make our experiments in the open air, on the banks of the pools in which the *gymnoti* abounded. We reached first a little village called *Rastro de Abaxo*; thence the Indians conducted us to *Caño de Bera*, a muddy stagnant pool of water, but surrounded with a beautiful vegetation of the *Clusia rosea*, the *Hymenea Courbaril*, the large Indian figs, and *Mimosæ* with odoriferous flowers. We were much surprised on being told that thirty wild horses must be caught in the neighbouring savannahs, to serve for the fishery of the electric eels. The idea of this mode of fishing, which they call *embarbascar con caballos*, (to stupify by means of horses,) is truly very odd. The word *barbasco* signifies the roots of *Jacquinia*, of *Piscidia*, or of any other poisonous plant, by the contact of which a great extent of water receives in an instant the power of killing, or at least of intoxicating or benumbing, the fishes. The latter rise to the surface of the water when they are poisoned in this way. As the horses driven here and there in a pool cause the same effect with respect to the frightened fishes, the natives, confounding cause and effect, call the two modes of fishing by the same name.

Whilst our host was explaining to us this strange mode of catching fish in this country, the troop of horses and mules arrived. The Indians formed a sort of *battue*, and encircling the poor quadrupeds closely on every side, compelled them to enter the pool. I can but imperfectly depict the interesting spectacle which the attack of the eels upon the horses presented to us. The Indians, holding long canes and harpoons, place themselves around the pool; some of them climb the trees whose branches project over the surface of the water; and all of them by their shouts and their weapons prevent the

horses from gaining the bank. The eels, confounded by the hubbub and splashing of the horses, defend themselves by the reiterated discharge of their electric batteries.

For a long time they seem victorious over the horses and mules ; everywhere we see the latter, stunned with the frequency and force of the electric shocks, disappearing beneath the water. Some of the horses recover themselves, and, despite the active vigilance of the Indians, gain the bank ; overcome by fatigue, and their limbs paralyzed by the power of the electric commotions, they lay outstretched upon the earth.

How I wished that a clever painter could have seized the moment when the scene was at its greatest animation. The groups of Indians surrounding the pools,—the horses, with mane erect, and eyes of fright and pain, struggling to escape from the storm which had surprised them ;—those yellow livid eels, like great aquatic serpents, swimming upon the surface of the water, and pursuing their enemy ;—all these objects presented, in truth, a most picturesque ensemble. I remembered the superb painting which represents a horse entering a cavern and scared at the sight of a lion ! The expression of terror was not stronger than we witnessed in this unequal conflict.

In less than five minutes, two horses were already drowned. The eel, being more than five feet in length, glides beneath the body of the horse or mule ; it then gives a discharge from the whole length of its electric organ. It attacks at the same time the heart, the digestive viscera, and above all the *plexus* of the gastric nerves. One cannot feel astonished, then, that the effect produced by the fish upon a great quadruped much exceeds that produced on man, which it only touches by one of the extremities. I doubt, however, that the *Gymnoti* kill the horses immediately ; I rather imagine that the latter, stunned by the electric shocks which they receive in rapid succession, fall into a profound lethargy. Deprived of all sensibility, they disappear beneath the water, the other horses and mules pass over their bodies, and a few minutes suffice to make them perish.

After this commencement, I began to fear that this conflict would terminate very tragically. I did not doubt but that I should in a little time see all the mules drowned. We pay, however, only eight francs for each, if the master of it is known. But the Indians assured us that the fishing would soon be over, and that it was only the first assault of the *gymnoti* that was formidable. In fact, whether it is that the galvanic electricity accumulates during a state of rest, or

that the electric organ ceases to perform its functions when fatigued by too long usage, the eels, after a certain time, resemble discharged batteries. Their muscular motions continue equally lively, but they have no longer the power of discharging very energetic shocks. When the conflict had lasted a quarter of an hour, the mules and horses seemed less alarmed ; they did not erect the mane, their eye expressed less pain and terror ; we saw them no longer fall over. On the other hand the eels, swimming half out of the water, and endeavouring to avoid the horses in place of attacking them, in their turn approached towards the bank. The Indians assured us, that no horse is killed when driven two days afterwards into the pool. These electric fishes require rest and abundant nourishment to produce and to accumulate a great quantity of the galvanic electricity. We know, by the experiments that have been made upon the torpedos (electric rays) of Italy, that on cutting or tying the nerves which go to the electric organs, the functions of these parts cease as the movement of a muscle is suspended, as long as the ligature of the main artery or nerve remains. The organs of the torpedo or *gymnotus* depend upon the nervous system and the vital functions : they are not mere electro-motive apparatuses, which attract from the surrounding bed of water the electricity they have lost. One cannot, therefore, be surprised that the power of the electric shocks of the *gymnoti* depends upon their health, and consequently upon rest, nourishment, age, and probably a great assemblage of physical and moral conditions.

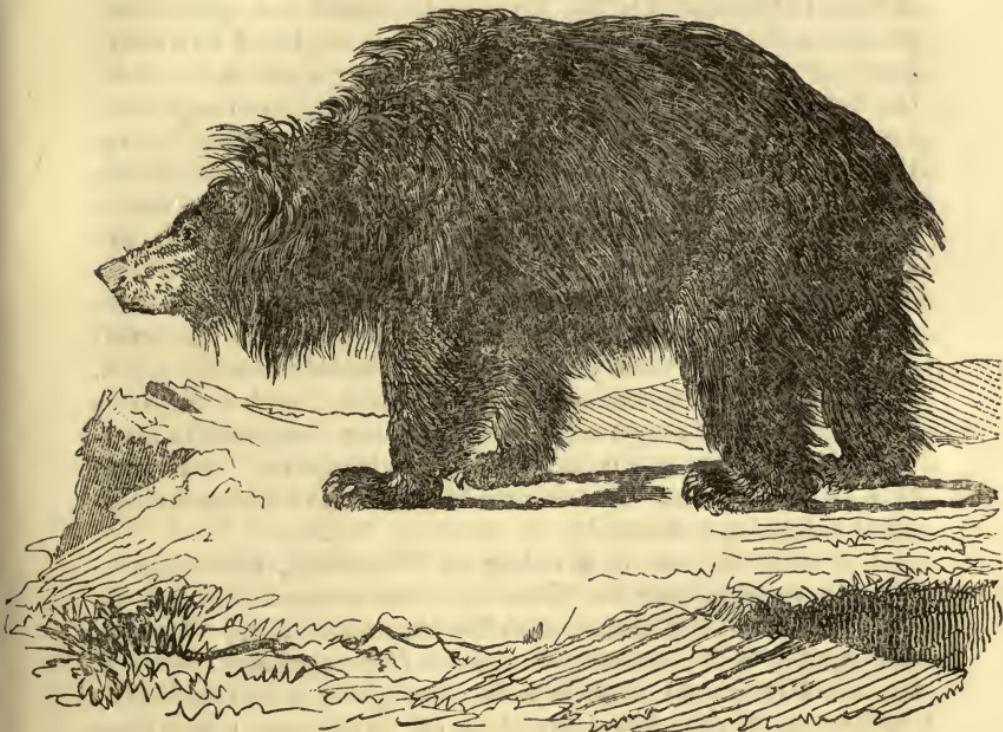
The eels, making towards the bank, are taken with great facility. Small harpoons, attached to cords, are cast at them ; the harpoon sometimes brings up two at a time. By this means they are drawn out of the water without the cord, which is very dry and of some length, communicating the shock to the person who holds it. In a few minutes five large eels were on dry land. One might have caught twenty, if as many had been wanted for our experiments. Many were only slightly wounded in the tail ; others severely in the head. We were enabled to observe the natural electricity of these fishes, modified by the different degrees of the vital force which they enjoyed. I shall describe in this *Memoir* not only the experiments made, in conjunction with M. Bonpland, on the *gymnoti* taken in our presence, but also those which we had an opportunity of making upon an eel of an enormous size, which we found in our house on our return from Rastro to Calabozo. This latter had been caught in a net ; it had not received any wound. Immediately on being

drawn out of the water, it had been put into the same tray in which it was brought to Calabozo. Remaining thus in the same water it was accustomed to, galvanic electricity had not been altered. We shall see, however, in the course of this Memoir, that the wounded gymnoti, that is to say, those of less power, are much more instructive in the inquiry into galvanic phænomena than the very active gymnoti, for many shades escape the eye of the observer when the electric torrent takes as impetuous a course across good conductors, as across those which are more imperfect.

When one has seen the eels knock down a horse, and deprive it of all sensibility, he is naturally afraid to touch them the moment they are brought out of the water. So strong, in fact, is this dread among the people of the country, that none of them could muster up resolution to disengage the gymnoti from the cords of the harpoon, or to transport them to the little holes filled with water which we had made along the bank of the Caño de Bera. It needed all our fortitude to receive ourselves the first shocks, which certainly were not very agreeable. The most energetic surpassed in power the most painful electric shocks I ever remembered to have received, accidentally, from a large and completely charged Leyden jar. From that time we readily conceived that, without doubt, there was no exaggeration in the story of the Indians, when they assert that persons who are swimming are drowned when one of these eels attacks them by the leg or the arm. A discharge so violent is fully capable of depriving a man for many minutes of all use of his limbs. If the gymnotus should glide along the belly or the chest, death might even follow instantaneously the electric shock ; for, as we have before observed, the most noble parts, as the heart, the gastric system, the coeliac plexus, and all the nerves that depend upon it, would at once be deprived of their irritability. A feeble electricity augments the vital forces,—a strong degree extinguishes them entirely.—*Voyage de Humboldt et Bonpland; Zoologie*, p. 54.

“ Seeing several stalls apparently covered with wheat, I approached to examine its quality, but was surprised to find that what had the appearance of wheat consisted of large ants’ eggs, heaped for sale. Near the same stalls were tubs full of pismires, crawling among the eggs, and over the per-

sons of those who sold them. Both the eggs and the ants are brought to Moscow as food for nightingales, which are favourite though common birds in Russian houses. They sing, in every respect, as beautifully in cages as in their native woods. We often heard them in the bird-shops warbling with all the fulness and variety of tone which characterizes the nightingale in its natural state."—*Dr. Clarke's Travels in Russia.*



THE LABIATED BEAR. (*Ursus labiatus*, Blainville.)

Of all bears the labiated or sloth bear presents the rudest and most shapeless figure. One might suppose that our great countryman Ray had had this species especially under his eye when he characterized * the ursine genus. The whole of its body and legs are concealed beneath a coat of long, coarse,

* "Totum ejus corpus tam denso pilorum crassorum vellere undique obtegitur et occultatur, ut rudis quædam indigestaque moles potius quam animal membris distinctum esse videatur, ut non injuria à Virgilio informe appelletur."—*Synops. Quadruped.* p. 171: 1693.

black hair, out of which there projects in front a narrow elongated ill-shapen snout ; while beneath this shaggy penthouse four great paws, turned awkwardly inwards, bespeak the quadruped.

Such, at least, is the general appearance of two of this species at present living in the Gardens of the Zoological Society, where, however, both the density and length of the covering may, perhaps, in some measure, be ascribable to the influence of our northern climate. This bear is, however, in its natural haunts, distinguished from all its tropical congeners by its denser coat of hair ; and it is doubtless owing to this natural protection that it is enabled to brave our winters with impunity, even when its den is placed in a comparatively unsheltered situation. The hair upon the back of the head and neck is so remarkably developed as to represent a sort of mane, exceeding a foot in length, and almost hiding the ears. The labiated bear differs also from the rest of the genus, in losing, at an early period of its existence, the whole or greater part of the incisor or front teeth ; his nostrils are supported by a peculiarly large and moveable cartilaginous plate, by means of which he can open or close their apertures at will, and in this way probably defends the nasal passages from the ants, into whose nests he intrudes his snout. The lips of this species are soft and fleshy, and susceptible of varied and extensive motion, often being elongated in a tubular form three or four inches beyond the jaws. It is from this peculiarity that the commonly adopted trivial name, *labiatus*, has been derived.

The labiated bear is a native of Hindostan, more especially the mountainous districts. It is common in Bengal, on the mountains of Silhet, and in the Deccan Ghauts. Its first appearance in this country was about fifty years ago. Bewick, in his *History of Quadrupeds*, has given a characteristic figure and an accurate description of this species ; and from the striking correspondence of parts observable between it and the common bear, as well as from an attentive examination of its disposition and manners, he was induced to place it in the same genus, notwithstanding it seemed to differ in some of those characteristics, which have been pointed out by naturalists as the guides to a regular and systematic arrangement. In an earlier and ruder figure, which we find in Caton's *Figures of Animals*, the good sense of the artist also detected the true relations of this subject, and the animal is called the *Petre Bear*.

There are few of our readers who, if they were asked if they had ever seen a living sloth, would not answer in the affirma-

tive, and perhaps be inclined to receive with incredulity our assertion, that their curiosity, with respect to this singular animal, still remains to be gratified.

But the fact is, that the animal, which is exhibited as the sloth in the travelling menageries, is the bear now under consideration; and we are not aware that either of the true species of sloth, which are peculiar to South America, has hitherto been brought alive to this country.

It is further remarkable, that the mistake of calling this species of bear a sloth, did not originate with an ignorant showman, whose interest it might be to deceive, but was committed by a scientific naturalist, who, however, in his examination of this animal, appears to have been guided by the letter, rather than inspired by the spirit of his great master Linnæus. In the Naturalist's Miscellany, vol. ii., Dr. Shaw observes, "In its habit or general appearance it has a striking resemblance to the common bear; and it has even been considered a species of bear by some naturalists. Its teeth, however, and the peculiar formation of its claws, with several other particulars, absolutely forbid it to be any longer considered as a species of *Ursus*." In what consists the peculiar formation of the claws, Dr. Shaw does not inform us, neither does he say more about the other particulars; but finding no trace of incisors, he referred his new animal to the order *Bruta*, in utter disregard of every other character save that which corresponded to the Linnæan phrase, "*dentes primores nulli utrinque*" (primary teeth none in either jaw). From the length of its claws, which, however, in this respect do not differ from those of many other species of bear; and probably also from the nature of its covering, and comparatively naked face, it was arranged with the genus of sloths, and entered in the Systematic Catalogue under the name of *Bradypus ursinus*,—the ursine, or ursiform sloth.

This new addition to one of the most remarkable genera of quadrupeds, soon attracted the attention of the continental naturalists; and although the false character with which our species had been invested, probably prevented the amount of its affinities to the bear being appreciated, yet the necessity of dissociating it from the sloths was soon perceived. It was accordingly at first supposed to be a new genus of quadrupeds, and was called *Prochilus*, from a Greek word signifying 'long-lipped'; but soon afterwards was recognised as a true bear.

In size this species is about the eighth part smaller than the Alpine bear; when young, and before the hairs have acquired their extreme length, it is seen to stand rather high upon its

legs, and its form is lighter than in after-life. Its motions are then agile, and it cannot easily be overtaken, even when pursued by a horseman at full speed. Its colour is a deep shining black, relieved by a white mark on the chest, shaped like a chevron or horse-shoe, the two branches of which extend over the arms. The muzzle and extremities of the feet are of a yellowish white colour.

The feet are armed with long, crooked, white claws, with which it is said to burrow in the ground: they are doubtless of considerable use in enabling it to dislodge the ants, which form part of its food, and to get at the stores of bees, which also contribute to form the diet of this creature in a state of nature. Bewick informs us that it will eat marrow or the fat of meat either raw or dressed; but refuses roots of all kinds, and the lean and muscular parts of flesh.

Its disposition is gentle and docile: it is taught similar exercises to those which the brown bear is made to learn; and it is exhibited in the same way by the jugglers of Hindostan, as the latter species is by the wandering Savoyards in Europe.

A very good notion of the peculiarities of the labiated bear may be derived from a glance at the synonyms that have been unmercifully heaped upon it by modern naturalists, as, for example—

- *Bradypus ursinus*, Shaw.
- *ursiformis*, Pennant.
- Prochilus hirsutus*, Iliger.
- Melursus hirsutus*, Meyer.
- Chondrorhynchus hirsutus*, Fischer.
- Ursus labiatus*, Blainville.
- *longirostris*, Tiedemann.
- Prochilus labiatus*, Gray.

And we are not sure whether some of our naturalists may not consider it as appertaining to Dr. Horsfield's new subgenus, and therefore as having a claim to the appellation of *Helarctos labiata*, unless Iliger's generic title of *Prochilus* be extended over all the tropical Sun-bears.

With respect to the animals included under the latter name, we may observe that they bear a close affinity with our present species. They have all long compressed claws, extensible lips and tongue, and are marked with the white spot on the throat; but they are smaller than the labiated bear, and are covered with short close-set hair. They are all gentle in their habits, and purely vegetable feeders. The Malayan species is peculiarly fond of the young protruding summits of the cocoa-nut trees, which always become its prize when the natives change their residence. In one of his excursions

through the Passumah district of Sumatra, Sir Stamford Raffles found the cocoa-nut trees of deserted villages destroyed by the Malayan bears.

In his description of the animals of Sumatra, this distinguished philosopher observes, “ The Malayan bear deserves to be ranked as a distinct species from the common bear, and from that of the continent of India. The most striking difference is in the comparative shortness of its hair, and the fineness and glossiness of its fur ; in which particular it appears to resemble the American bear.

“ When taken young they become very tame. One lived for two years in my possession. He was brought up in the nursery with the children ; and when admitted to table, as was frequently the case, gave a proof of his taste by refusing to eat any fruit but mangosteens, or to drink any wine but champaign. The only time I ever knew him out of humour was on an occasion when no champaign was forthcoming. It was naturally of a playful and affectionate disposition, and it was never found necessary to chain or chastise him. It was usual for this bear, the cat, the dog, and a small blue mountain bird, or lory, of New Holland, to mess together and eat out of the same dish. His favourite playfellow was the dog, whose teasing and worrying was always borne and returned with the utmost good humour and playfulness. As he grew up he became a very powerful animal ; and in his rambles in the garden he would lay hold of the largest plantains, the stems of which he could scarcely embrace, and tear them up by the roots.”—*Linn. Trans.* xiii. p. 255.

USEFUL RAT.

ON the farm of Lyonthoin, near Falkirk, there is a remarkable instance not only of docility but usefulness in a rat. It first devoured the mice caught in traps, and was afterwards seen to catch them as they ventured from their holes, till at length the whole house was cleared of these vermin, except, as is believed, a single one. It has frequently been seen in pursuit of this solitary mouse, and the little fugitive, which takes refuge behind the ingle, has a part of its fur singed off. From the service it renders, the family kindly protect the rat, and it runs about and gambols among them on the floor, without the least uneasiness.

SINGULAR AUDACITY OF A FISH.

IN most classes of animals, even in those of the most timid disposition, instances of remarkable courage have occasionally been observed and recorded. It is rarely, however, that fish of diminutive size have been found bold enough to repel the attacks of man, much less to become the aggressor, as in the following instance, related by the highly talented naturalists who accompanied Captain Freycinet in his late voyage round the world.

“ It happened one day, while we were wading in calm water among the coral reefs at the Island of Guam, in search of molluscous animals, that we were assailed by a small che-todon, butting against us with the end of its snout, as if to defend the approach to the rock under which it lodged, with many others of the same kind. We stretched out our hands towards it, against which it precipitated itself in the same manner. In order to drive it away we struck it several times, which made it retreat, but without alarming it, for it returned again to the charge. At last it disappeared suddenly in a hole formed by the corals.

“ This species was scarcely larger than one’s hand ; its colours, though brown, were however agreeable. We call the species *bellicosus*.”—*Quoy & Gaimard, Zoologie du Voyage*, p. 383.

ANIMALS AND BIRDS ON THE PLAINS OF CAMDEBOO.

TRAVELLING over the Karoo plains of Camdeboo, Barrow thus describes the various animals and birds he met with. He says :

Naked on the surface appeared to be game of every sort even very plentiful, particularly spring-boks and the larger kinds of antelopes. Upon those parched plains are also found several species of a small quadruped which burrows in the ground, and which is known to the colonists under the general name of meer-cat. They are mostly of that genus of animals to which zoologists have given the name of *Viverra*. An eagle, making a stoop at one of these, close where we were passing, missed his prey ; and both fell a sacrifice, one to the gun, the other to the dogs. Both the bird and the quadruped appeared to us to be undescribed species. Of the eagle, the head, neck, back and abdomen, were of a pale ferruginous brown ; wings and tail steel-blue, the latter faintly barred with small bands from the root to the middle ; the

cera pale yellow ; the beak and nails black ; the feet entirely covered with downy feathers ; length two feet two inches. The viverra was wholly of a bright chestnut colour ; the tail shaded with black hairs, bushy, straight, and white at the extremity ; ears short and round ; on the fore feet five, and the hind feet four toes ; the body and tail each one foot long. Others of this genus are the muskiliatte cat, or zenik of the *Systema Naturæ* ; the tigrina, or tiger cat ; the mellivora, or ratel ; and the cafra. In general these animals are easily domesticated. One species however it is very difficult, if not impossible, to render tame. It resembles the putorius or polecat of America, with this difference only, that the latter has five parallel white lines along the back, and the African species only four that diverge from the shoulder. When first taken they smell very strongly of musk, which, however, shortly wears off by confinement. There is also found in this part of the country a beautiful little ground-squirrel, with a white stripe on each side from the shoulder to the flank ; the body a dark chestnut colour, about eight inches in length ; tail ten inches, grizzled, black, brown, and white.

That elegant bird the Balearic Crane, *Grus pavonina*, was first met with near the Melk River ; and Guinea fowls were very abundant near every streamlet. Bee-eaters, *Merops apiaster*, with their beautiful plumage, and Certhias or creepers with colours still more brilliant, were fluttering about in vast numbers among the *Mimosæ* of the Sunday River, where are also many beautiful species both of kingfishers and woodpeckers. The modest garb of the Colii, of which I met with three species, formed a striking contrast with the gaudy plumage of the others. There are several species of Swallows in the Cape, all migratory. One in particular, with a red spotted breast, frequents the habitations of man, where it builds its nest. In many of the farm-houses are small shelves nailed against the beams, expressly for the swallows ; and I have heard it asserted very commonly, that the same birds return to their places for many years, and generally on the very same day : which, if true, is a striking instance to prove that nature is not more constant in the organization of the machine than in the effects that are intended to result from it.

The Sunday River was nearly dry, which gave our people an opportunity of taking plenty of turtle with great ease. These, when full grown, are generally in size about a foot in diameter ; the females are exceedingly prolific in eggs, and the flesh is by no means wanting in flavour. The river abounds also with short thick eels that are very delicious.—*Barrow's Africa*, vol. i. p. 187.

DESCRIPTION OF ANIMALS, &C. IN BRAZIL.

THE following interesting sketch of the animated creation in the wilds of South America, is taken from the Travels in Brazil of two learned foreigners, Drs. Von Spix and Martius.

“ How different are the feelings of the traveller when he passes from the dark low forests into the free and open tracts ! On these serene and tranquil heights the noisy inhabitants of the wood are mute : we no longer hear the howling of herds of monkeys, the incessant screams of innumerable parrots, orioles, and toucans, the far-sounding hammering of the woodpeckers, the metallic notes of the uraponga, the full tones of manakins, the cry of the huccos, jacus, &c. The more numerous are the humming-birds, buzzing like bees round the flowering shrubs ; gay butterflies fluttering over the rippling streams ; numerous wasps flying in and out of their long nests hanging suspended to the trees ; and large hornets hovering over the ground, which is undermined to a great extent with their cells. The red-capped and hooded fly-catcher, the barbets, little sparrow-hawks, the rusty red or spotted Brazilian owl, bask on the shrubs during the heat of noon, and watch concealed among the branches for the small birds and insects which fly by ; the tinamus walks slowly among the pine-apple plants, the cuapupés and nambús in the grass ; single toucans, seeking berries, hop among the branches ; the purple tanagers follow each other in amorous pursuit from tree to tree ; the caracará and the caracaú flying about the roads, quite tame, to settle upon the backs of the mules or oxen ; small woodpeckers silently creep up the trees and look in the bark for insects ; the rusty thrush, called João de Barros, fearlessly fixes its oven-shaped nest quite low between the branches ; the siskin-like creeper slips imperceptibly from its nest (which, like that of the pigeons, is built of twigs, and hangs down from the branches to the length of several feet,) to add a new division to it for this year ; the Cäoha sitting still on the tops of the trees, looks down after the serpents basking on the roads, which, even though poisonous, constitute its food ; and sometimes, when it sees people approaching, it sets up a cry of distress, resembling a human voice. It is very rarely that the tranquillity of the place is interrupted, when garrulous orioles, little parrots and parroquets coming in flocks from the maize and cotton plantations in the neighbouring wood, alight upon the single trees on the campos, and with terrible cries appear still to contend for the booty ; or bands of restless hooded cuckoos, crowded together

upon the branches, defend, with a noisy croaking, their common nest, which is full of green speckled eggs.

“Alarmed by this noise, or by passing travellers, numerous families of little pigeons, often no bigger than a sparrow, fly from bush to bush: the larger pigeons, seeking singly among the bushes for food, hasten, alarmed, to the summits of the neighbouring wood, where their brilliant plumage shines in the sun; numerous flocks of little monkeys run whistling and hissing to the recesses of the forest; the cavies running about on the tops of the mountains, hastily secrete themselves under loose stones; the American ostriches, which herd in families, gallop at the slightest noise, like horses, through the bushes, and over hills and valleys, accompanied by their young; the dichotopus, which pursues serpents, flies, sometimes sinking into the grass, sometimes rising into the trees, or rapidly climbing the summits of the hills, where it sends forth its loud deceitful cry, resembling that of the bustard; the terrified armadillo runs fearfully about to look for a hiding place, or, when the danger presses, sinks into its armour; the ant-eater runs heavily through the plain, and in case of need, lying on its back, threatens its pursuers with its sharp claws. Far from all noise, the slender deer, the black tapir, or a pecari, feed on the skirts of the forest. Elevated above all this, the red-headed vulture soars in the higher regions; the dangerous rattle-snake hidden in the grasses, excites terror by its rattle; the gigantic snake sports suspended from the tree with its head upon the ground; and the crocodile, resembling the trunk of a tree, basks in the sun on the banks of the pools. After all this has passed, during the day, before the eyes of the traveller, the approach of night, with the chirping of the grasshoppers, the monotonous cry of the goat-sucker, the barking of the prowling wolf, and of the shy fox, or the roaring of the ounces, complete the singular picture of the animal kingdom in these peaceful plains.”

ACCOUNT OF THE RED-THROATED HUMMING-BIRD,—*Le petit Rubis de la Caroline.*

[Translated from “Lesson’s *Histoire Naturelle des Oiseaux Mouches.*”]

“ALTHOUGH this bird,” says M. Vieillot (*Ois. Dorés*, p. 66.) “lives for four or five months in the more northern parts of America,—as it is to be met with at New York about the beginning of May, and in Canada from about the end of the month until the autumn,—yet it equals in beauty those which

never leave the torrid zone. Some of them, indeed, have their throat adorned with the most brilliant colours. In one point of view, it is of a bright green ; in another, it has the fire and brilliancy of the ruby ; in a third, its sides are covered with gold ; and if we look at the bird underneath, it presents the sombre hue of the garnet. It is impossible to describe the numerous shades of colouring which it exhibits. This humming-bird retires during the winter to the Floridas, and is rarely met with in the Antilles.

“ It is not wild, but as soon as any one approaches in order to capture it, it springs up and vanishes like lightning. These little beings are extremely envious of each other. If several of them should meet on the same tree, when in blossom, they attack one another with the greatest impetuosity, and continue the pursuit with so much ardour and pertinacity, that they will fly into a room, where they continue the combat, which is concluded only by the flight of the vanquished and the loss of a few feathers. When the flowers are faded, they evince their vexation and anger by tearing off the petals, with which they strew the ground.

“ These humming-birds cannot support the total deprivation of liquid honey for more than twelve or fourteen hours at the most*; and they frequently die from this cause in the autumn; when, if they have been detained by a late brood beyond the proper period of their departure, and the flowers are destroyed by early frosts, the elasticity of their wings is weakened by the want of nourishment. The movements of the bird are no longer executed with that velocity which holds it suspended over the blossom that contains its food. The more their want increases, the more their powers diminish ; they frequently alight, they fly less swiftly, they rest themselves on the ground, languish, and die. Their young, when hatched late in the season, are exposed to this danger, and may frequently be met with in the autumn perishing in this way.

“ The difficulty of obtaining these beautiful birds, without injuring their plumage, has given rise to the invention of several different modes of catching them. Some drown them by means of a syringe ; others kill them with a pistol loaded with sand ; and indeed, when very near to them, the explo-

* Audubon observes, that the humming-bird is insectivorous, and that it inserts its bill into the flowers in order to extract the minute insects that live in their interior, and thus relieves them from these enemies ; and that they also catch many small flies while on the wing. He says, “ The nectar or honey which they sip from the different flowers, being of itself insufficient to support them, is used more as if to allay their thirst.”

sion of the powder is sometimes sufficient to stun them and bring them to the ground. It scarcely need be observed, that even the very finest shot should not be used in the pursuit of these small birds, for a single grain would shatter them and leave only a wreck of their beauties. These plans are but ill adapted to their object, as water injures the feathers of the bird, and sand makes it fall to the ground. I have therefore had recourse to two other methods ; I have employed with success the net called spider's web, with which I surrounded the shrubs at the distance of a foot or two. The bird cleaves the air with such rapidity that it has not time to perceive the net, and is thus easily caught. I have also made use of green gauze in the shape of a butterfly net ; but this method requires much patience, and can only be employed on plants and small shrubs. The person must be carefully concealed ; for although the bird will approach very near, it is not the less distrustful ; and if any strange object should excite his suspicion, he quits the flower, rises about a foot above the plant, remains there perfectly stationary, examines the object which disturbs him, and when he has ascertained that his fear is well founded, he utters a cry and disappears. To have any degree of success in this pursuit, a little niche must be constructed as low as possible with plants and surrounding shrubs, from which the bird may be covered with the net, in the same way that a butterfly is caught.

“Lastly, having observed that these birds often perched upon the dead branches of shrubs,—and wishing to behold in the sun and on the living animal, all the beauty of a plumage resplendent with a thousand hues, the brilliancy of which is tarnished by the hand of death,—I inserted some small sticks into the flowers, upon which they perched. I had thus for a minute the pleasure of seeing them dart their tongue into the nectar-bearing cup, to draw from it a liquor suited to the delicacy of their organs.

“This bird places its nest on trees and shrubs ; the inside consists of the brown down of the sumac, and the outside is covered with lichens. The one which I have preserved was on a small branch of the red cedar. The male brings the materials, and the female arranges them ; two eggs are laid of a size proportioned to that of the bird, and each parent sits alternately.”

OBSERVATIONS ON SOME MOLLUSCA AND ZOO PHYTES, REGARDED AS THE CAUSES OF THE PHOSPHORESCENCE OF THE SEA.

[Translated from "Freycinet's *Voyage autour du Monde.*"]

It is in places where the phænomena which assist in their production are constantly renewed, where floods of light and heat penetrate and warm the water, where electricity seems profusely diffused through every substance,—that myriads of animalculæ are, as it were, spontaneously produced. When a perfect calm succeeds to the light breezes which agitate the surface of the sea, it seems as if a magic wand animated the bosom of the waters, and that their constituent principles had assembled and joined together to produce life.

We have often contemplated this spectacle; it broke the monotony of calms, and diminished the ennui of long voyages. But no one is ignorant, that it is necessary to be initiated in the study of the secrets of Nature in order to appreciate her wonders; for these seas, so full of life to the observer, are inanimate and devoid of interest to the generality of men, who only regard the more striking objects.

It is chiefly in straits near the land, and in rather shallow places, that the animalculæ are produced in the greatest numbers. In the Molluccas, for instance, one need only draw up a little water in a bucket in order to procure several varieties of them. Some are long and cylindrical; others circular and flattened. The greatest number are of a round form; these swim and twirl about with much activity, while those seem to consist simply of an immovable gelatinous mass. Sometimes the sea was covered with fibres, with minute filaments, or rather with a kind of dust apparently inanimate, but probably an organized body. It is difficult to form a conception of this productiveness; it equals if it does not exceed that which is going on upon earth.

Phosphorescence is a phænomenon which, although attached to many different animals, belongs peculiarly to the marine mollusca:—about this, much has been written, and it still leaves a vast field for conjecture; since, as regards the manner in which it is effected, every thing remains to be discovered.

Truly we may say, that we have observed this singular spectacle under all meridians, since we have passed under all; we have even beheld results, which no one has mentioned; and yet we must confess that we are not more advanced in a knowledge of the principle which produces phosphorescence than when we began to examine it ten years ago. Therefore, without aspiring to the honour of starting an hypo-

thesis, we shall content ourselves with adding to the facts already known some simple remarks, by means of which more skilful observers may perhaps develop the cause of the surprising power which those animals possess, which we are now considering.

We can no longer be in doubt as to the general causes of the luminosity of the sea. Naturalists have shown that it is produced by animalculæ which multiply in its waters; that it belongs neither to the liquid, nor to electricity, still less to putrefaction; although in that state some mollusca, such as the Salpæ and Calmars, are susceptible of emitting some light, although always of short duration. An active phosphorescence is essentially connected with life; for animalculæ and mollusca whose vital powers are weakened emit scarcely any light, and that is extinguished when they cease to exist. This luminosity is occasionally an inherent property of the substance of some Medusæ, Salpæ, Beroes, &c., and these animals are not able to strengthen or to weaken it. Others, on the contrary, strange to say! enjoy this power, and can so modify the light, that they spontaneously increase, diminish, or extinguish it altogether, as we shall hereafter mention.

Calm weather, heat, and a superabundance of electricity in the atmosphere increase the intensity of the phosphorescence. Night renders it more apparent, and agitation develops it. All who have sailed between the tropics near to land, and in tolerably shallow water, know what a brilliant train of light the vessel leaves behind her. This beautiful light has exercised the pen of more than one traveller; and each, in describing it according to the impression which it produced upon him, has but too often embellished it still more by an exaggerated description. However it may be, the development of phosphorescence by agitation is a truly wonderful circumstance. When at rest, the waves do not make apparent any other light than that of some large mollusca; but when they are agitated, every living molecule becomes luminous. And if at the same time the active dolphins play around the ship, they seem to resemble serpents of artificial fire under the water. But when they respire the air with noise, the illusion increases, and we seem to behold and hear the firing of a gun.

No doubt the viscosity of the sea may be referred to this incalculable quantity of animalculæ. The greater number, which are invisible from their transparency, by the aid of phosphorescence become luminous points, which attach themselves to anything that is plunged into the water. Hence probably has arisen the idea that many living fishes were luminous:—it may be so; we do not deny it: yet we must consider them rare,

as we have never seen them. Fishes may be distinctly seen swimming about when the sea is luminous ; and it even seems that they contribute to give it that appearance ; but if examined when at rest, it is easy to convince oneself that the power of emitting light is not inherent in them ; and that the effect produced by them in this case is the same that may be obtained by agitating any inanimate substance in the sea."

Our authors then proceed to detail some experiments relative to these phosphorescent phænomena, the results of which may be thus stated.

Diluted sulphuric acid, gently added to sea-water, containing the phosphorescent animalculæ, excited a sudden brilliancy, arising from distinct globules of light, which gradually faded into darkness. A fresh dose of the acid caused a re-appearance of the light : but a third repetition of the experiment produced no effect ; the animalculæ were destroyed, and the phosphorescence could not by any means be reproduced. When undiluted sulphuric acid was added to the water, the animalculæ suddenly perished, emitting a slight luminosity. Vinegar and muriatic acid produced the same effect,—the latter especially with much greater force.

" What is the true cause of this phosphorescence ? Which is the organ that in the more simple mollusca, as well as the more complicated, serves to impress upon our view such effects ? These are questions that, perhaps, will never be answered with certainty. We shall confine ourselves to making a single remark on this subject, which is, that in studying these animals, and handling great numbers of them, our sense of smell has always experienced the same sensation as that produced by a great quantity of electricity collected in the plate of an electrical machine.

" The observation with which we shall conclude this chapter, is the most remarkable fact of this kind which we have yet beheld.

" Having anchored under the small island of Rawak, situated exactly under the Equator, we one evening saw lines of a dazzling whiteness on the water. Crossing them in our canoe, we wished to take up some portion, but we found nothing but water, whose light disappeared in our hands. Soon afterwards, during the night, and while the sea was calm, we saw several of these white steady lines near the ship. Upon examination we discovered that they were caused by some very small zoophytes ; and that these possessed a principle of phosphorescence so subtle, and so capable of expansion, that when they swam swiftly, and in a zigzag direction, they left glittering trains on the sea about an inch wide, which

afterwards increased to two or three inches by the agitation of the waves. Their length was sometimes several fathoms. Generators of this fluid, these animals emit it at pleasure. A luminous point is observed to spring up suddenly on their body, and then to increase rapidly. A bottle, which we laid on the surface of the sea, received two of these animalculæ, which immediately rendered all the water luminous. By degrees this light diminished, and at last disappeared. It was in vain that we endeavoured to perceive the animal with the microscope, or by means of a candle (an easy way of distinguishing transparent mollusca in water); everything had disappeared. We can only say that, by the light which these animals shed, we could perceive that they were extremely minute.

“We have often reflected on the wonderful faculty with which these microscopic zoophytes are endowed; and we have always found it inexplicable, unless we suppose, in order to give a reason for so extraordinary a fact, that they conceal within themselves some principle of phosphorescence, which they emit at pleasure; and that this principle becomes visible only when combined with the water of the sea.

“We only mention a few facts, it is true, but we may venture to assert that they were as well observed as we could do it in our double capacities of physicians and naturalists, and while we were rapidly traversing immense distances.”—*Zoologie*, ii. p. 402, par *MM. Quoy et Gaimard, Médecins de l'Expedition.*

THE ZOOLOGICAL GARDENS.

As no addition of any consequence has been made to the Menagerie in the Regent's Park, we have little to add to our last report. The alterations in the grounds we before alluded to are in a state of considerable forwardness, and will form a great improvement both as regards appearance and utility. Although the absence of verdure, of flowers, and of the gay company which render these gardens so delightful in summer, now conduces to render them less attractive to the general visitor; yet, to the Zoologist, they are perhaps, on that account, more useful, as the animals can be studied with fewer interruptions. We regret to state that the fine old male lion, which has been some time in a declining state, is dead. Some of the monkeys have also been lost, exhausted by the variable and inclement season. We cannot help thinking this Institution might adopt with advantage some of the

plans which the experienced proprietor of the Surrey Gardens finds so successful in preserving the health of the more delicate animals. His monkeys, for example, instead of being confined by twos and threes in close cages, are preserved in a large space, well ventilated and heated, and defended by a glass frame ; and here they can disport and exercise themselves throughout the whole winter.

At the Scientific Meeting, held on the 12th of February, some interesting communications were read, including a letter from M. Geoffroy St. Hilaire, referring to some observations lately published by Mr. Owen on the *Ornithorhynchus paradoxus* of New South Wales ; from Capt. Hallam, with an account of the Mango Fish ; and Mr. Martin's notes on the dissection of a Lemur.

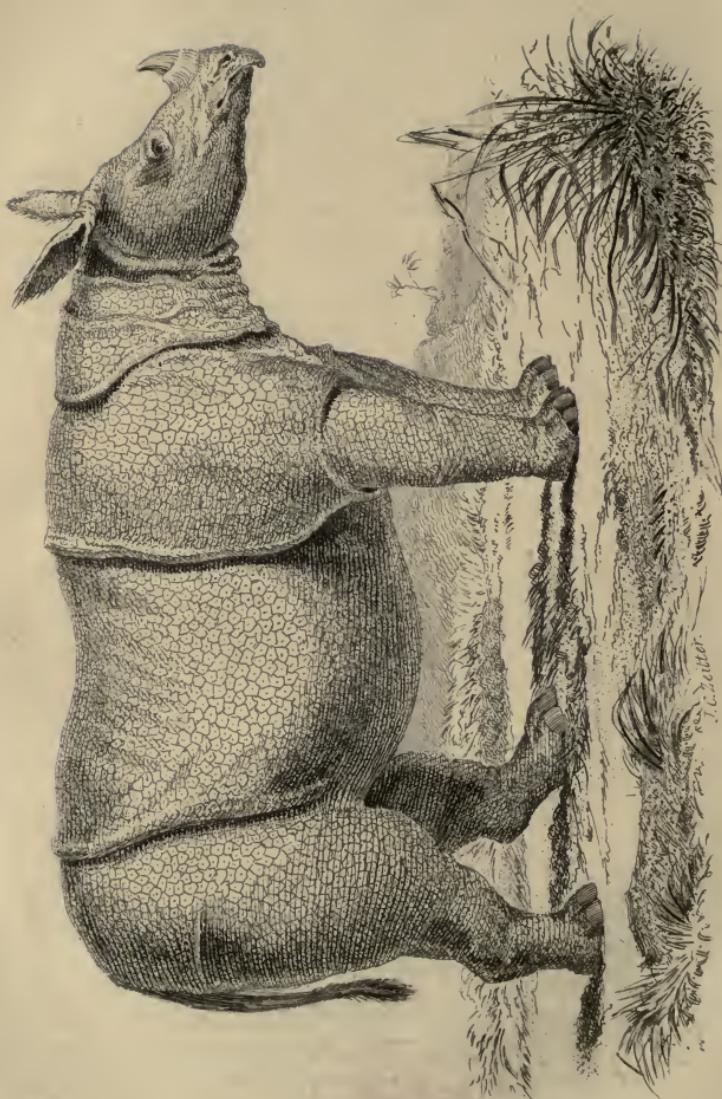
Notice of a Motion on the subject of closing the Gardens on Sunday during the hours of Divine Service has been given ; and it was stated that sales of many of the animals now at the Farm at Kingston, and duplicates of those in the Gardens, are about to take place during the spring.

ZOOLOGIST'S CALENDAR FOR MARCH.

The animals which we mentioned in our Calendar for January, as being in a state of torpidity, are now beginning to show some symptoms of existence, and to re-appear after their winter's repose. To these we may add the Tortoise (*Testudo græca*), and the Toad (*Bufo vulgaris*), which also make their appearance in the course of the present month. To such of our readers as are anglers it will almost be superfluous to remark that now trout begin to rise.

The Crow (*Corvus corone*) begins to build : several kinds of Birds lay their eggs and sit in the course of this month. Amongst others, we may enumerate the Blackbird (*Turdus Merula*), the Turkey (*Meleagris Gallopavo*), and the Raven (*Corvus Corax*). It is only occasionally, however, that this occurs, as it is more frequently during the next month that these birds lay their eggs.





RHINOCEROS SONDAICUS.

THE
ZOOLOGICAL MAGAZINE.

THE RHINOCEROS OF JAVA. (*Rhin. Sondaicus*, Cuv.)

IN the time of Linnæus only a single species of the more bulky quadrupeds, as the elephant, rhinoceros, and hippopotamus, was known; and Buffon, who too frequently generalized on slight grounds, considered it as a law of Nature, that in these her larger productions the genus was limited in its representation to a solitary species. But every day brings fresh instances of the boundless extent of the Creative Power; and both species that now move on the surface of the earth, as well as those which are concealed beneath its crust, demonstrate that the principle of variety is by no means limited to the minuter forms of animal life.

We have in a former Number enumerated the different species of Rhinoceros which are at present known to exist, and have given a detailed account of the One-horned Rhinoceros of the Asiatic Continent, (*Rhinoceros Indicus*, Cuv.)

The present description relates to the one-horned species which inhabits the Island of Java, which is the smallest rhinoceros now known to exist. Its specific distinction from the *Rhin. Indicus* was first suspected by Camper, from the difference he observed in the form of their crania. Subsequently the Baron Cuvier established with great exactness the peculiar characters of this species, founded on a comparison of its entire skeleton with that of the Indian rhinoceros, and on a drawing and description of the living animal which he had received from India.

It has not been known to exceed nine feet in length, is less massive in its proportions, and stands higher on its legs, than the Indian species. It has only a single horn, which is situated nearer the eyes than the front horn of the two-horned species, and which in the female is reduced to a mere semi-oval tuberosity; the front teeth or incisors of the upper jaw are four in number in the young animal; two in each intermaxillary bone, small and almost cylindrical: they are soon shed, and are replaced in the adult by two small external incisors, and two large internal ones; the latter, however, scarcely project from the gums, and are smooth and rounded at the extremity, which is opposed to the front part of the long inferior incisors.

The learned and indefatigable naturalist, Dr. Horsfield, to whom we are chiefly indebted for a knowledge of the ani-

mal creation in the Island of Java, observes, “ The folds of the hide, on the whole, appear less rough or prominent than in the Indian rhinoceros : those of the neck are comparatively smaller ; and the posterior fold, which has an oblique direction towards the spine, is less extended. The thick covering or coat of our animal is divided on the surface into small tubercles, or polygonous scutula ; and a few short bristly hairs, rising from a slight depression in the centre, constitute a peculiar character. The ears are bordered with a series of long stiff bristles, closely arranged ; and a similar series of bristles also extends along the tail, underneath, through its whole length.”

When the French descriptions in the *Histoire Naturelle des Mammifères* and the *Encyclopédie Méthodique* were written, nothing was known of the habits of this species. This hiatus has been in a great measure supplied by the accurate observer above quoted. “ The individual which is represented in our plate, and which has afforded the preceding details, was taken, while very young, in the forests of the Province of Kedda, and was conveyed to the Residency at Magellan in the year 1815 or 1816. By kind treatment it soon became domesticated to such a degree, that it permitted itself to be carried in a large vehicle resembling a cart, to the capital of Surakarta. I saw it during its conveyance, and found it perfectly mild and tractable. At Surakarta it was confined in the large area or square which bounds the entrance to the royal residence. A deep ditch about three feet wide limited its range, and for several years it never attempted to pass it. It was perfectly reconciled to its confinement, and never exhibited any symptoms of uneasiness or rage, although, on its first arrival, harassed in various ways, by a large proportion of the inhabitants of a populous capital, whose curiosity induced them to inspect the stranger of the forest. Branches of trees, shrubs, and various twining plants were abundantly provided for its food ; of these the species of *Cissus*, and the small twigs of a native fig-tree were preferred. But plantains were the most favourite food, and the abundant manner in which it was supplied with these by the numerous visitors, tended greatly to make the animal mild and sociable. It allowed itself to be handled and examined freely, and the more daring of the visitors sometimes mounted on its back. It required copious supplies of water, and when not taking food, or intentionally roused by the natives, it generally placed itself in the large excavations which its movements soon caused in the soft earth that covered the allotted space.

“ The animal rapidly increased in size : in the year 1817, having been confined at Surakarta about nine or ten months, the dimensions, as already stated, were nine feet in length, and four feet three inches in height at the rump. In 1821 it had acquired the height of five feet seven inches. This information I received from my friend Mr. Stavers, who is now in England, on a visit from the interior of Java ; and he favoured me further with the following detail, which completes the history of the individual whose figure is annexed to this article. Having considerably increased in size, the ditch of three feet in breadth was insufficient for confining it ; but leaving the inclosure, it frequently passed to the dwellings of the natives, destroying the plantations of fruit-trees and culinary vegetables which always surround them. It likewise terrified those natives that accidentally met with it, and who were unacquainted with its appearance and habits. But it showed no ill-natured disposition, and readily allowed itself to be driven back to the inclosure, like a buffalo. The excessive excavations which it made by continually wallowing in the mire, and the accumulation of putrefying vegetable matter, in the process of time became offensive at the entrance of the palace, and its removal was ordered by the emperor to a small village near the confines of the capital, where in the year 1821 it was accidentally drowned in a rivulet.

“ The rhinoceros lives gregarious in many parts of Java. It is not limited to a peculiar region or climate, but its range extends from the level of the ocean to the summit of mountains of considerable elevation. I noticed it at Tangung, near the confines of the Southern Ocean, in the districts of the native princes, and on the summit of the high peaks of the Priangan Regencies ; but it prefers high situations. It is not generally distributed, but is tolerably numerous in circumscribed spots, distant from the dwellings of man, and covered with a profuse vegetation. On the whole, it is more abundant in the western than in the eastern districts of the island. Its retreats are discovered by deeply excavated passages, which it forms along the declivities of mountains and hills. I found these occasionally of great depth and extent.

“ In its manners, the rhinoceros of Java is comparatively mild. It is not unfrequently met in the wilds by Europeans and by natives. No instance of its showing a disposition to make an attack has come to my knowledge ;—being the largest animal in Java, its passions are not roused, as in many parts of India, by contentions with the elephant. It is rarely seen in a domestic state, but it is occasionally decoyed into pits, and destroyed. Our animal rambles chiefly at night, and

often occasions serious injury to the plantations of coffee and pepper, which are laid out in the fertile districts selected for its retreats.

“ The horns and skin are employed for medicinal purposes by the natives*.”

The Baron Cuvier observes that the folds of the hide are observable in the foetal animal. These folds differ in their arrangement from those of the Indian rhinoceros; they are altogether wanting on the head, the integument of which is rugous and covered by a cuticle divided into small angular plates like those on the body; the fold behind the occiput is situated close to the head; another stretches like a hood transversely across the middle of the shoulders, and extends on either side beneath the throat, so as almost to form a continuous circle. A second doubling, which also nearly begirts the body, is situated behind the shoulders: a transverse fold exists above each fore-leg, but there is no fold in the direction of the spine, as in the Indian rhinoceros: a large fold crosses the region of the crupper, and descends on either side in front of the thighs: a slighter depression advances forwards upon the thigh on either side from the root of the tail.

This species has hitherto been found only in the Island of Java. It is called by the Malays, Badak.

The extended and minute comparisons which have been instituted between the several bones of this species and those of the Indian rhinoceros, prove incontrovertibly the specific difference of the two animals. These observations, with figures of the skeletons, &c., are contained in the second volume of the great work by Cuvier on Fossil Remains.

The extinct species whose osseous remains have hitherto been collected and compared, are four in number. First, The rhinoceros described by Pallas in the Commentaries of the Petersburg Academy (1773). Not only are its bones found scattered abundantly over Siberia, but the entire carcass, enveloped in its hairy hide, has been preserved from the ravages of time, frozen up in the ice on the banks of the Wiluji, a river which opens into the Lena. This rhinoceros had two long horns, which were supported by a strong bony, instead of gristly, partition of the nostrils; hence the name, which Cuvier has given to this species, of *tichorrhinus*. This enormous species appears to have extended its wanderings into Germany, France, and even England, in all which countries its bones are occasionally found.

The remains of the second extinct species abound in Italy, principally in the Val d'Arno in Tuscany, and in the valley

* Zoological Researches in Java.

of Pô in Lombardy, mingled with the bones of elephants and hippopotamuses. It bore also two horns on the nose, but had not the bony partition of the nostrils : it also wanted incisive teeth ;—in all of which characters it approximates to the living two-horned species of Africa ; but its nostrils are much narrower, and the bones of the nose thinner : it is termed *Rhinoceros Cuvieri*, and *Rhin. pectorinus*.

The third species (*Rhinoceros incisivus*.) is known only by its enormous incisive teeth, which could only have belonged to an animal as large as the two fossil species we have just mentioned, which are totally devoid of this kind of teeth.

Lastly, A fossil species, with incisive teeth, not larger than a common hog, has been discovered ; teeth and numerous bones, not only of adult but of old individuals, have been found in France : M. Cuvier denominates it *Rhinoceros minutus*.

REMARKS ON THE ALBATROSS AND PETREL.

[From Freycinet's 'Voyage autour du Monde.']

THE ocean has its own peculiar birds as well as the land. Compelled to traverse incessantly its solitudes to obtain their subsistence, they are endowed with a wonderful power of flight ; so that in a few hours they are able to cross immense distances, and to betake themselves to those places to which their instinct directs them. Among these numerous tribes there exist distinctions of manners as decided as the physical characters by which they are classified ; and this induces us to give the name of Birds of the Ocean (*oiseaux pelagiens*), properly so called, to the petrels and the albatrosses. The former are found in every sea, under every meridian, and in almost every latitude. Except the short time which they devote to rearing their young, all the rest of their life is occupied in traversing the ocean, and laboriously seeking in the midst of storms, a scanty sustenance, almost as soon digested as procured ; which seems to place them under subjection to a single duty, that of obtaining nourishment.

Boobies (*Sula Bassana*), Noddies (*Sterna*), Men of War Birds (*Pelecanus Aquilus*, Linn.) and Tropic Birds (*Phaëton erubescens*), although they occasionally take long flights over the sea, do not deserve the name of Birds of the Ocean : they simply make excursions ; and preferring their lonely cliffs to the rocking of the waves, they generally return to them every evening.

The discrimination of the several species of Albatross has become a matter of great difficulty, from the many different

names that successive travellers have bestowed upon them, and from the difference between the sexes, as well as from the change which takes place in the same individual at different ages and at different seasons of the year.

The greatest number of albatrosses are met with between the 55th and 59th parallel of latitude, and probably in that direction they may have no boundary but the polar ice. Although they are to be met with over the whole of this vast space, there are some places for which they have a preference, and in which they are found in greater numbers than elsewhere. They are most abundant about the Cape of Good Hope and about Cape Horn, and both these places are well known to be almost constantly the scenes of very violent storms.—The petrels are more numerous, and more widely diffused, since they are to be met with from pole to pole, and they vary very much in size. The albatross is distinguishable by its great size; but one species of the petrel (*Procellaria gigantea*) is nearly as large, while another species is as different from this as a sparrow from a goose.

It is certain that fish do serve for food to the albatross and petrel, although they were never seen pursuing the flying fish, which are said to fall a prey to them when they leave the deep, and, betaking themselves to their wings to avoid the enemy in the water, only encounter a new danger in the albatross; nor were any remains, either of these or of the mollusca,—which, as it were, cover these seas, and would alone be sufficient to satisfy one of these birds for a whole day,—ever found in their stomachs. We have seen them surrounded with Sea-blubbers, *Physaliæ*, *Salpæ*, &c., but these afforded them no nourishment; they invariably sought other food. This was not the case with cuttlefish and calmars, fragments of which were constantly found in their stomachs.

One circumstance which could not escape notice during our long voyages, is the habit, we should almost say the necessity, which these birds are under of frequenting rough seas. The tempest itself does not alarm them; and when the wind is blowing most furiously they may be seen wheeling about without appearing at all affected by it. When, on the other hand, the face of the ocean is smoothed by a calm, they fly to other regions, again to appear with the return of winds and storms. No doubt the reason of this is, that the agitation of the waves brings to their surface those marine animals which serve for food to these birds. It is from the same reason that they keep near the eddying and disturbance occasioned by the passing of a vessel through the water. This design was clearly demonstrated to us when approaching

the Cape of Good Hope. We were accompanied by a great number of small petrels of the size of kingfishers, who were busy skimming the surface of the water in a line of exactly the width of our track. None were to be seen anywhere else. We took great care that nothing should be thrown from the corvette ; and yet we saw them every instant, darting their bills into the water to seize some object which we were unable to distinguish.

The duration, the rapidity, the strength and the manner of flight of these birds in general, has been a subject of study and astonishment to us. Their agility in casting themselves, like a harpoon, on their prey, in raising it with their beak, their activity in striking the backs of the waves with their foot, or in traversing their long unsteady ridges, were sometimes the only spectacle which the solitudes of the ocean had to offer to us.

One of the peculiar characters of these *Palmipedes* (web-footed birds) is, that their flight is effected almost entirely by sailing as it were through the air. If they do sometimes flap their wings, it is in order to raise themselves more quickly ; but such instances are rare. In the albatross, which was principally remarked upon, both from its great size and from its approaching nearer to the ships, it was observed that their long wings were concave underneath, and that they did not show any apparent vibration in whatever position the bird might be ; whether when skimming the surface of the wave they regulated their flight by its undulations, or when rising into the air they described wide circles around the vessel.

Land birds of prey who fly in this way without moving their wings, are generally descending towards the earth when they adopt this mode of flight ; while the petrel and the albatross easily raise themselves up into the air, turn quickly round by means of their tail, and go on in the face of the highest wind without their progress appearing to be at all diminished by its force, and without any apparent motion being imparted to their wings. But still we must admit that some impulse is given to the air which sustains them,—although we cannot perceive it, it is true, since it probably is exerted at the end of very long levers (at the extremities of their wings) ; for, otherwise, we cannot conceive how the progressive motion of the animal is accomplished. The exceedingly long wings which many of these birds possess, spoil the beauty of their figure when closed, as they produce a thickness in the posterior part of the body. It is when flying that they display themselves to the greatest advantage ; and they are endowed with a wonderful strength to enable them to per-

form their flights. When in 59° south latitude, where there is scarcely any night as long as the sun is under the tropic of Capricorn, we have seen the same petrels sailing on the wing several days together without interruption. The petrels do not dive after their food, but if it lies only at a certain depth, they endeavour to seize it by forcing part of their body under water.

From what has been said it appears, that the mere presence of these birds is not a sure sign of the approach of land.

With respect to the incubation of these pelagic birds, the French naturalists observe, that the petrels flock in immense numbers to the 'Isles Malouines,' along the shores of which their eggs are deposited in such abundance as to be a source of subsistence to the seamen employed in the seal-fishery. They were also informed that these birds arrange their eggs with much order, and, living as it were in a republic, exercise by turns the function of incubation in this kind of temporary establishment.

The little stormy-petrel (*Thalassidroma pelagica*, Vigors) breeds in the Orkneys.

Mr. Scarth states*, that in passing over a tract of peat-moss, near the shore, in a small uninhabited island in Orkney, one evening in the month of August last, he was surprised to hear a low purring noise, somewhat resembling the sound of a spinning-wheel in motion; and on inquiry, he was informed by one of the boatmen who accompanied him, that it was the noise commonly emitted by the Alimonty (the Orkney name for the stormy petrel,) that frequented the island when hatching.

On examining a small hole in the ground, he found the bird and its nest, which was very simple, being little more than a few fragments of shells laid on the bare turf. It contained two round pure-white eggs, which were very large in comparison with the size of the bird. When he seized the bird, she squirted out of her mouth an oily substance of a very rancid smell. He took her home, and having put her into a cage, he offered her various kinds of worms to eat; but, as far as he could observe, she ate nothing till after the expiration of four days, when he observed that she occasionally drew the feathers of her breast singly across, or rather through her bill, and appeared to suck an oily substance from them. This induced him to smear her breast with common train oil; and observing that she greedily sucked the feathers, he repeated the smearing two or three times in each day for about a week. He then placed a saucer containing oil in the

* Linn. Trans. xiii. p. 617.

cage, and he observed that she regularly extracted the oil by dipping her breast in the vessel, and then sucked the feathers as before. In this way he kept her for three months. After feeding, she sat quietly at the bottom of the cage, sometimes making the same purring noise which first attracted his notice, and sometimes whistling very shrilly.

DEATH OF M. LATREILLE.

OUR readers who are interested in the science of Entomology will learn with regret that the death of M. Latreille was announced to the *Académie des Sciences* on the 11th of February last. This illustrious naturalist, the collaborator of the great Cuvier, was born at Brives (Corrize), in the year 1762 ; he was attached to the Museum of the Garden of Plants at Paris in 1797, as assistant to Lamarck ; with whom he was afterwards made adjunct Professor, and upon his death succeeded to the chair of the Natural History of Invertebrate Animals. He was elected into the Academy of Sciences in 1814. His principal works are : The Natural History of the Salamanders of France, 1 vol. 1800. The Natural and General History of Ants, with a Collection of Memoirs, 1 vol. 8vo. 1802. Natural History of Crustacea and Insects, forming a continuation of Sonnini's edition of Buffon, 14 vols. 8vo. *Genera Crustaceorum et Insectorum*, 4 vols. 8vo. 1809. Natural History of Reptiles, forming a continuation to the Buffon of Castel, 4 vols. 8vo. The third volume of the 1st edition of Cuvier's *Règne Animal*, and the fourth and fifth volumes of the 2nd edition of the same work ; many Memoirs among those of the Academy of Sciences, and of the Museum of Natural History ; and the principal articles on Entomology in the Dictionary of Natural History by Deterville.

He has been succeeded by M. Valenciennes, a naturalist well known since his association with Cuvier in the '*Histoire Naturelle des Poissons*.'

EULOGIUM ON CUVIER.

THE following is translated from M. Valenciennes' Introduction to the Ninth Volume of the great work on Fishes, which has recently appeared.

“ We were pursuing assiduously the publication of our work ;—I continued to assist my illustrious master :—Who

would then have told me that this volume would appear covered with the funeral crape !

“ The first pages were hardly printed when the Sciences had to deplore one of the greatest losses that they could sustain. The first naturalist of our age was destined not to see the termination of the great work, of which he had conceived the plan, and to which he consecrated a great part of his powers.

“ To a superior strength of genius, which Nature at remote periods grants to those privileged men whom she would raise above the scene of the world as monuments of the glory of the human intellect, M. Cuvier united two eminent qualities, which most other men are deficient in ; an activity which no labour could fatigue, and a most astonishing patience in researches of the minutest kind, but which are always necessary to the discovery of truths.

“ These two qualities, aided by a great justness of thought and a vast erudition, have given to the Works of this great man a character which we seek for in vain in those of the other naturalists of our times.

“ The curiosity of his mind leads him to dissect the numerous animals whose organization still remained to be studied ; his patience in observation brings such exactness in the knowledge of facts, that by this first labour the class Vermes emerges, one may say, out of chaos. Pursuing his first researches, he publishes that succession of admirable memoirs for the basis of the natural history of mollusca : they are models of literary critique, of precision in description, and of sagacity in the art of selecting and representing zoological characters.

“ His genius manifests itself with still greater superiority in his immortal Work on the researches of the fossil bones of extinct animals.

“ M. Cuvier had studied the beings which animate and adorn the actual surface of the globe.

“ He had made known their varied organization in the too modest title of ‘ Lectures on Comparative Anatomy.’

“ He had distributed them according to a methodical order, in a work which became classical the moment it was published ;—but this was not enough for a mind that would compel Nature to reveal her most hidden secrets.

“ M. Cuvier penetrates beyond the ages which the most ancient traditions make known to men ; he soars above our planet, sees the earth peopled with species which he re-creates, and makes known to us their forms with as much certainty, as he himself said, as if he had seen the animals in our menageries : he penetrates the depths of ocean, and

beholds swimming there those enormous marine reptiles, of which we now find only the scattered remains.

“To arrive at that degree of certainty in the knowledge of extinct animals, M. Cuvier is obliged to make, on the living species which he compares to the antediluvian forms, observations which demonstrate his immense knowledge, and the justness of his mind in the art of discrimination. His work becomes a fruitful source of instruction for the zoologist and the anatomist. His critical and literary discussions on the animals known to the ancients, complete the natural history of many species commenced by Buffon. He sketches out the history of many others, discovered since the death of his predecessor and rival in glory. His osteological descriptions, full of facts as new as they are curious, commence a comparative osteology unknown before his time. The preliminary discourse of that work, now read as a distinct and separate work, translated in all the living languages of Europe, is filled with principles, as just as they are admirable, upon the perpetuities of species, and on the accidental variations which may happen to certain among them: they will ever serve as a guide to those naturalists, who, not permitting themselves to be led astray by the imagination, will see in physical phænomena that only which observation can discover.

“M. Cuvier had scarce written the last pages of that imperishable work, when the ardour of his genius led him to undertake a new work, still more considerable, *The Natural History of Fishes*. We again find the same character pervading the execution of the plan created by the genius of M. Cuvier.

“He commences by studying one after the other all the species which he is able to collect, and the number then exceeded four thousand. This preliminary labour ended, M. Cuvier then writes these descriptions, remarkable for their exactness without dryness, and which naturalists, jealous of producing durable works, will without doubt seek to imitate.

“M. Cuvier had the happiness to enjoy during his lifetime the duration and solidity of his Works. Having considered under every point of view the objects which he had studied, he established laws, conceived by his vast intelligence, which have remained immutable as the order of nature upon which they are based.

“But I feel my voice too feeble for the eulogium of the great Master! A grateful pupil, I ought only to express myself in words of gratitude, and to remember his latest wishes. He has charged me to terminate the Work, in which he had willed me to be his associate. The numerous materials we

had collected together are now at my disposal ; I shall religiously execute the last commands of my illustrious friend ; and, if I may hazard that expression, I shall have the glory of having completed his Works, as far at least as my powers will permit me."

ACCOUNT OF THE REIN-DEER.

[From the Journal kept by Mr. Cartwright in Labrador, 1779.]

"I TOOK a walk round the island with the dogs, but saw nothing ; I was also attended by my young deer, which is now perfectly tame,—and I shall here make some remarks on those animals. Notwithstanding rein-deer are naturally very wild and timorous, yet no creature is so soon or so effectually tamed if taken young ; but what they may be when caught afterwards, I cannot tell. They not only grow very bold, but also show great affection for such men and dogs as they take a liking to, and have a great spite against those who affront them. This deer of mine has had its full liberty ever since the fourth day after it was caught (except a few nights' confinement in the crib, lest the dogs should kill it when we were all asleep) ; but since then it has constantly lain out. It is not in the least alarmed at any noise, not even at the report of a gun fired close to it ; but it is much terrified if any dogs run after, or even near it, and any running of the people instantly affrights it : but the moment all is quiet, it is so too. It will often go up to a dog, and smell to him ; it is well acquainted with all mine, and will lie down by the fire amongst them. I believe they scarce ever sleep, for as much as I have watched this, I never could observe that it was ever asleep, or kept its eyes closed for more than two seconds at a time ; and if I moved ever so little, it would start up. When I have lain down on the bed, at a time when it was lying on the floor, it would start up every five or six minutes, and come to see that I was not gone ; and having licked my face, or sucked my neckhandkerchief a little, it would quietly lie down again. When at any time it lost me, it would run about, grunting somewhat like a hog, and never rest until it had found me, when it would run up to me at full speed. Sometimes I have diverted myself with stooping and running, both after and from it, which pleased it much ; and it would do the same, and frisk about in the same manner as I have seen the wild calves one among another : I have likewise observed, that whenever it is frightened, it erects its single (tail), which at all other times hangs down.

" It is a mistaken notion that they will not eat grass, or scarcely anything but white moss ; for they will eat every kind of vegetable which this country naturally produces ; alexander (a species of berry) and some few other things excepted : nor have I yet been able to discover that any beast in this country* would eat alexander, except black bears, which are very fond of it. Rein-deer do not seem to relish grass much, yet I have seen mine eat a little, and it generally preferred the coarsest kinds. I have often observed that, in the latter end of April, and in the month of May, the wild ones eat little else besides dry grass and wild rye, which then appear through the snow. They affect great variety in their food, while things are in a growing state ; preferring the youngest and most juicy. This causes them to vary their food every month, and also several times in the same day, accordingly as it is moist or dry ; rejecting now, what an hour ago they preferred to everything else. The leaves of the dogberry-bush when young, and a tender plant which grows by hill-sides on moist ground, resembling cross lettuce, as also a succulent aquatic plant which grows in ponds, all these they devour most greedily. There is a small pond near this house which is full of the latter, and this deer of mine has eaten it close down to the water. I think I have seen the same kind of plant in the Highlands of Scotland, and is what they use there in their beer instead of hops. They also delight to eat the young leaves of most sorts of trees and shrubs which have not a resinous juice, particularly the willow : but I have known them eat the outer shoots of the black spruce in the winter time, though but sparingly. I most wonder that they are not fond of vetches, which grow in great abundance here. I have often tracked the wild ones through large beds of them, without observing that they cropped any ; yet I have seen mine eat a few sometimes. This will eat a little of the crumb of soft bread, but will scarcely touch the crust or biscuit ; but that may be owing to the tenderness of its teeth. Pudding and boiled potatoes it is very fond of, but will not eat the latter raw ; it will also eat boiled salt meat.

" They are very sure-footed, for they will run along shore, over sharp, rough rocks, or smooth, round, loose stones, without ever stumbling or slipping ; but on smooth ice they can with difficulty stand. They are beautifully made, are as straight-limbed, and have nearly the same shape as the horse, only not so good a neck. They walk, trot, and gallop in the same manner, and no old hunter will take either a flying or standing leap with more grace or judgement than my young

* Labrador.

deer will now. They have great strength and are remarkably active, which renders them very useful in a sledge. They go very wide behind, are fearless of their road, and will swim with most extraordinary swiftness, and to a prodigious distance: I am certain they will swim more than five miles in an hour, and I verily believe six. The stags have a deal more courage than the hinds, and those hinds which have calves have less than the dry ones. When they hear a noise, or if they see a man standing perfectly still, their curiosity will often tempt them to make out the object; a curiosity which I have known prove fatal to them; for they will frequently gallop or trot down within sixty or a hundred yards, and there stand and gaze for the space of a minute or two. When they are satisfied, they run off, and generally sink the wind to be informed of a pursuit. In the winter they most commonly go several miles before they rest. If pursued by a dog, they husband their speed and wind surprisingly; for they will suffer their pursuer to come by degrees within a few yards of them, but no nearer if they can prevent it; they will then continue to run at his rate until he is tired; and as soon as he stops, they will do so too, and turn about and look at him; after which they will go leisurely on, but often stop to look back. If they are upon ice where there is much snow, they will not quit it for the barren hills. When pursued in the summer time they always make for the nearest water, in which no land animal has the least chance with them. If their enemy comes up with them, they defend themselves with their horns and hind feet, and are so strong and active that a fair stroke with either generally proves fatal to wolf or dog, if the deer be an old one. I have often eaten of various kinds of venison, and in different countries, but I think none equal to that of the rein-deer when in proper season. From the observations which mine has given me opportunities to make, I am fully of opinion, that there are many parts of England where they would live and thrive well; but I do not think they would exist in such parks as produce nothing but fine grass.”—Vol. ii. page 472.

OBSERVATIONS ON THE WILD ASS.

[From Sir Robert Ker Porter's Travels in Georgia, Persia, &c.]

“THE sun was just rising over the summits of the eastern mountains, when my greyhound, Cooley, suddenly darted off in pursuit of an animal, which my Persians said, from the

glimpse they had of it, was an antelope. I instantly put spurs to my horse, and followed by Sedak Beg and the meh-mandar*, followed the chase. After an unrelaxed gallop of full three miles, we came up with the dog, who was within a short stretch of the creature he pursued; and to my surprise, and at first, vexation, I saw it to be an ass; but, on a moment's reflection, judging from its fleetness, it must be a wild one, a species little known in Europe, but which the Persians prize above all other animals as an object of chase. I determined to approach as near to it as the very swift Arab I was on would carry me. But the single instant of checking my horse to consider, had given our game such a head of us, that notwithstanding all our speed, we could not recover our ground on him. I, however, happened to be considerably before my companions, when, at a certain distance, the animal in its turn made a pause, and allowed me to approach within pistol-shot of him. He then darted off again with the quickness of thought, capering, kicking, and sporting in his flight, as if he were not blown in the least, and the chase were his pastime.

“ He appeared to me to be about ten or twelve hands high; the skin smooth, like a deer’s, and of a reddish colour; the belly and hinder parts partaking of a silvery grey; his neck was finer than that of a common ass, being longer, and bending like a stag’s, and his legs beautifully slender; the head and ears seemed large in proportion to the gracefulness of these forms, and by them I first recognised that the object of my chase was of the ass tribe. The mane was short and black, as was also a tuft which terminated his tail. No line whatever ran along his back, or crossed his shoulders, as are seen on the tame species with us. When my followers of the country came up, they regretted I had not shot the creature when he was so within my aim, telling me his flesh is one of the greatest delicacies in Persia;—but it would not have been to eat him that I should have been glad to have had him in my possession. The prodigious swiftness and peculiar manner with which he fled across the plain, coincided exactly with the description that Xenophon gives of the same animal in Arabia, (vide *Anabasis*, lib. i.)†. But, above all, it reminded

* “ Accompanied by my Persian provider (that being the real import of the name ‘Mehmandar.’)” — *Ibid.* page 203, vol. i.

† And of the wild animals, the greatest number were wild asses, but there were also many ostriches; and there were in that country (Arabia) both bustards and antelopes; and our horsemen used sometimes to pursue these wild animals; and when pursued the asses would run forward and then stand still, (for they run much faster than a horse); and when the

me of the striking portrait drawn by the author of the Book of Job. I shall venture to repeat it, since the words will give life and action to the sketch that is to accompany these pages.

“ ‘Who hath loosed the bonds of the wild ass? whose house I have made the wilderness, and the barren land his dwellings? He scorneth the multitude of the city, neither regardeth he the crying of the driver. The range of the mountain is his pasture.’

“ I was informed by the mehmandar, who had been in the desert when making a pilgrimage to the shrine of Ali, that the wild ass of Irak Arabi differs in nothing from the one I had just seen. He had observed them often, for a short time, in the possession of the Arabs, who told him the creature was perfectly untameable. A few days after this discussion, we saw another of these animals, and pursuing it determinately, had the good fortune, after a hard chase, to kill it and bring it to our quarters. From it I completed my sketch. The Hon. Mountstuart Elphinstone, in his most admirable account of the kingdom of Caubul, mentions this highly picturesque creature under the name of *Goorkhur*; describing it as an inhabitant of the desert between India and Afghanistan or Caubul. It is called *Gour* by the Persians, and is usually seen in herds, though often single, straying away, as the one I first saw, in the wantonness of liberty.” Vol. i. page 459.

This animal was met with in the first instance soon after Sir Robert Porter had entered, from the northward, into the province of Tars, called by the ancients Persis, or Persia Proper.

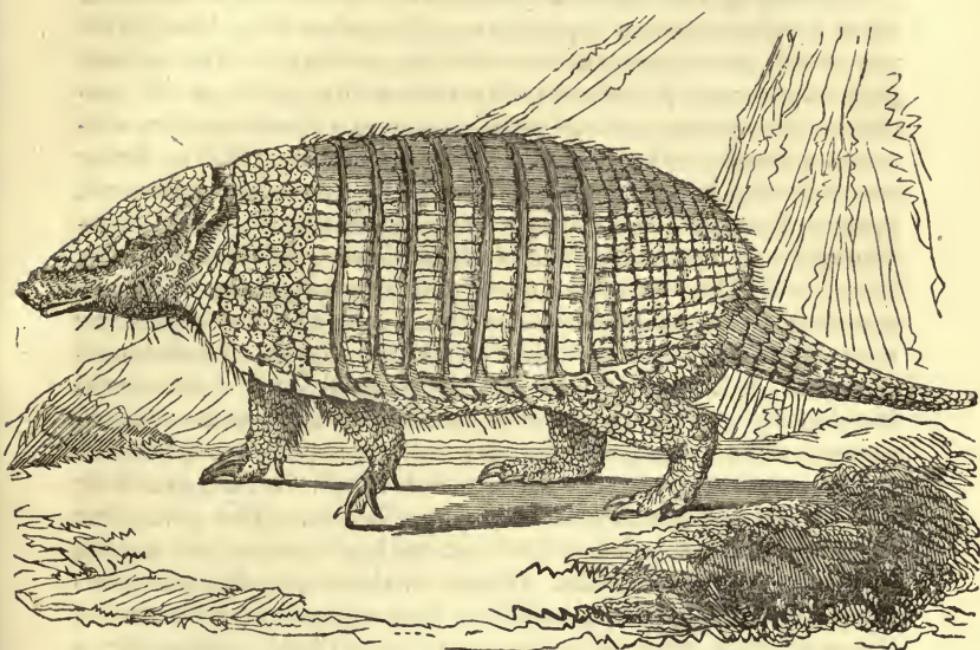
DISPOSITION OF THE 'MANGEUR DE SERPENS' (Secretary Falcon).

[From Le Vaillant's *Oiseaux d'Afrique*, vol. i. p. 109.]

“ WHEN taken young, this bird soon becomes familiar, and readily feeds itself; it lives with the poultry, and if care is taken to feed it plentifully, it does them no harm; but if, on the contrary, it be left to famish, the pullets and young ducks very soon become his prey; it is only the want of them which makes him do any mischief, if indeed it is mischief to provide for his own subsistence. It is not his nature to be

horse again approached them they did the same as before; so that it was impossible to take them, unless the hunters, having stationed themselves at intervals, should relieve each other, and continue the chase in succession with fresh horses. And the flesh of those which were taken was like venison, but more tender.—*Xenoph. Anab.* ib.

quarrelsome: on the other hand he seems to love peace; for, if there should be any quarrel among the animals in the court-yard, he runs directly to separate the combatants. Many persons at the Cape of Good Hope rear these birds in their yards, as much in order to preserve peace there as to destroy the lizards, serpents, and rats which frequently enter to devour the poultry and eggs."



THE WEASEL-HEADED ARMADILLO,

DASYPUS Mustelinus, *Tatu Mustelinus*, Grew and Ray; *En-
coubert*, Buffon; *Dasypus sex-cinctus* and *Dasypus octode-
cem-cinctus*, Linnæus. This armadillo, the *Tatou poyou* of the Spanish naturalist D'Azara, is one of the smaller species of a numerous tribe of quadrupeds peculiar to the continent of South America.

Buffon introduces this singular genus to our notice, with a fine strain of eloquence. "When a quadruped," says he, "is mentioned, the very name seems to convey the idea of an animal covered with hair. In the same manner, when we speak of a bird or a fish, feathers and scales present themselves to the imagination, and appear to be inseparable attributes of these beings. Nature, however, as if she intended to withdraw herself from all method, and to elude our most general views, contradicts our ideas and denominations, knows

nothing of our arbitrary characters, and astonishes us still more by her exceptions than by her laws. Quadrupeds, which should be regarded as constituting the first class of animated nature, and are, next to man, the most conspicuous creatures in this world, are nevertheless neither superior in every respect, nor separated by permanent characters or attributes from all other beings. The first character, that of having four feet, and from which their name is derived, is found among the lizards, frogs, &c., which differ so much from quadrupeds in every other article, that they have, with propriety, been thrown into a distinct class. The second general property, that of being viviparous, belongs not exclusively to quadrupeds, but is common to them and the cetaceous animals. In fine, the third attribute, that of being covered with hair, which appears to be the least equivocal, because it is the most conspicuous, is wanting in several species which cannot be retrenched from the order of quadrupeds; since, with the exception of this character alone, their resemblance to each other is complete. And as these seeming exceptions of nature are in reality but the shades she employs to connect beings of the most remote kinds, we ought to seize these singular relations as often as they present themselves. The armadillos, instead of hair, are covered, like the turtles, lobsters, &c., with a solid crust. The manis is armed with scales similar to those of fishes. The porcupine carries a kind of prickly feathers, without vanes, but having quills like those of birds. Thus, in the class of quadrupeds alone, and in the most constant and apparent character of these animals, that of being covered with hair, nature varies by making them approach the three very different classes of birds, fishes, and the crustaceous tribes. Hence we ought never to judge of the nature of beings by a single character, for it will always be found imperfect and fallacious. Even two or three characters, though extremely general, are often insufficient; and, as I have frequently remarked, it is only by the union of all the attributes, and an enumeration of all the characters, that a judgment can be formed concerning the permanent and essential qualities of the productions of nature. Accurate descriptions, without any attempt toward definitions, a more scrupulous examination of the differences than of the similarities, a particular attention to the exceptions, and even to the slightest shades, are the true guides, and, I will venture to affirm, the only means we possess of investigating nature. If the time lost in framing definitions and methodical arrangements had been employed in making good descriptions, we should not at this day have found Natural

History in her infancy, but should have had less difficulty in removing her swaddling clothes and her toys, and perhaps might have advanced her age, for we should have written more for science and less against error.

“ But to return to our subject. Among viviparous quadrupeds, as we have seen, there are several species of animals which are not covered with hair. The armadillos alone constitute an entire genus, which includes a number of distinct species, and all of them are covered with a crust resembling bone.”

This crust or armour consists, 1st, of a plate which defends the head; 2nd, of a large shield situated over the shoulders, and formed of small compartments of a rectangular, or of a many-sided form, disposed in transverse rows; 3rd, of bands made up of transverse rows of more elongated pieces, which bands vary in number according to the species, and are moveable; 4th, of a shield upon the crupper, analogous in its composition to that of the shoulders; 5th, of rings surrounding the tail for a greater or less extent.

The hind feet have five toes in all the species; the fore feet have also five in some, but in others have only four toes. The muzzle inclines more or less to a point. The tongue is smooth, almost cylindrical, and moderately extensible. The hairs are few and scattered, and are principally situated along the under part of the body and on the legs; it is from the latter circumstance that the Linnæan term *Dasypus*, or hairy foot, is applied to this genus.

The small compartments that compose the bands and shields are firmly and immovably united together in each division of the armour; but they are nevertheless all distinct and they separate from each other when exposed to the action of fire. They vary in their forms in the different species, but are generally disposed with great regularity, resembling mosaic work. The entire crust, or armour, is covered with a thin and transparent cuticle, which gives it a shining appearance, as if it were varnished.

The skin on the under surface of the body is covered with scale-like warts, from which the long hairs spring out, generally in a determinate number. The same kind of excrescences cover the legs, but they are more closely approximated, and more scale-like. The tail is thick, pointed, and very straight. There is a concavity in the posterior margin of the hinder shield over its root. In one of the species, the *Cabassou*, or 12-banded armadillo of Erxleben, the tail is hairy, and is not protected by a crust; in the other species, the annular structure of the defensive integument permits a slight mobility.

The ears are moderately large, erect, pointed and moveable. The eyes small, and placed laterally. The extremities are thick, and hardly longer than is necessary for preventing the body trailing on the ground. The claws are very long, a little curved, very powerful and adapted for burrowing.

The teeth are all of one kind as respects their form, which is designed for triturating, or grinding ; but, as in the species we shall more particularly describe in this article two of these teeth are implanted in the intermaxillary bones, they, together with those which are opposed to them in the lower jaw, have been regarded as incisors, and consequently as indicative of a generic distinction. The teeth are of a cylindrical form, those of the same jaw separated by intervals from each other, and meeting those of the opposite jaw by oblique grinding surfaces.

The moveable bands are separated by narrow intervals of naked and flexible skin, which gives to the body a great mobility at this part, and enables the animal to contract itself into a ball, when assaulted. These central bands vary in number from three to twelve in the different species, but are not so well calculated as Linnæus supposed, to serve as distinctive characters, since their number is not always the same in individuals of the same species ; they also become more distinctly marked by age.

With his coat of mail the armadillo defends not only his head and all the upper part and sides of the body, but also the neck, which, being extremely short, can be covered by the corresponding margins of the plates of the head and shoulder. By the same means, the armadillo, in retracting his head, covers the sides of that part by the margins of the shoulder-piece. With respect to the four legs, they are naturally concealed by the lower margins of the shields and bands ; but as the feet are deprived of this advantage, they are on that account defended by the strong scales.

The armadillos have hitherto been only met with in the warm and temperate parts of South America, as New Spain, Guiana, Brazil, Paraguay and Chili. They live solitary, or in small societies, some in the woods, others in the plains or pampas. Their burrows extend downwards at an angle of about 45 degrees, and have sudden turnings, so as to render their extent difficult to be ascertained ; but they appear in general not to exceed eight feet in length.

The species may be enumerated as follows :—

a. *Armadillos with incisors and molaries.*

1. The Weasel-headed Armadillo ; *Dasypus mustelinus*.

b. *Armadillos wanting incisors.*

2. The Three-banded Armadillo; *Dasypus (Tatusia) tricinctus.*
3. The Pig-headed Armadillo; *Dasypus porcinus*; *Tatu porcinus*, Grew; *Tatusia Peba*, Desmarest.
4. The Hybrid Armadillo: *Dasypus hybridus*, Desm.
5. The Spurious Armadillo; *Dasypus Tatouay*, Desm.
6. The Hairy Armadillo; *Dasypus villosus*, Desm.
7. The Dwarf Armadillo; *Dasypus minimus*, Desm.
8. The Giant Armadillo; *Dasypus (Priodontes) Gigas.*
9. The Truncated Armadillo; *Dasypus (Chlamyphorus) truncatus.*

The term *Poyou* which D'Azara gives to the weasel-headed armadillo signifies 'yellow-handed;' he observes that it is also sometimes called 'pepondo,' or hairy. This species measures one foot and a half from the extremity of the nose to the setting on of the tail, which is nine inches and a half in length. The head measures five inches in length, and the ears an inch and a quarter. The form of the head is triangular, flat or very slightly convex above; broad behind. The muzzle short: the coronal plate or helmet is composed of irregularly disposed segments: it is slightly notched on either side over the eye, and the angles are, as it were, cut off in front of the ears. On each cheek-bone there is a small series of irregular scales, with strong bristles growing therefrom projecting beneath the eyes. A transverse row of eight or nine pieces crosses the neck. The scapular shield is composed of six rows of segments, which, separating as they extend from the middle line of the back to the sides, receive other segments of a similar form in the intervals. The margin of each segment is as it were divided into a series of six or eight smaller segments, surrounding a larger central piece. The moveable bands are seven in number, composed of elongated rectangular segments. The shield covering the loins is composed of ten rows of less elongated pieces, similarly sculptured to those of the scapular shield. The tail is round and conical; it is surrounded at its base with three or four rings; the remainder is irregularly covered with tubercular segments.

The number of teeth are nine on either side of the upper jaw, and ten on either side of the lower; the anterior teeth differ neither in form nor function from the rest, they are incisors only in respect to the bone in which they are implanted.

The four extremities are terminated each by five toes. The nipples are pectoral, and two in number. Large hairs may be observed projecting from the hinder part of the segments composing both the moveable bands and the shields.

This species is very common in Paraguay, and burrows

with incredible agility. It possesses great strength, and runs with considerable swiftness; notwithstanding it has the broadest, flattest, and least agile form of any of the genus.

Besides devouring roots and grain, this species is insectivorous; it penetrates and overturns the firmest and strongest ant-hills, and wherever it abounds does great service to the neighbourhood by clearing it of the destructive insects whose united labours construct those remarkable habitations. It also acts as scavenger, and will devour any carrion. If a horse or mule dies, the armadillo penetrates the carcase where the integument most readily gives way, burrows beneath it, and devours the whole of the flesh without making any other breach in the skin than that by which it entered.

M. Fr. Cuvier makes the following observations on an armadillo closely allied to this species, which lived for many years in the Menagerie at the Garden of Plants in Paris. "If we were to judge of the intellectual faculties of the species by the individual now under consideration, we should conclude that the *Encoubert* possesses them in a very limited degree. When he is set at liberty, he goes running to the right and to the left, digging in one corner, and then suddenly stopping to run and scratch in another. A sudden noise startles him; he stops to listen, but he does not seem to perceive the presence of a new object, nor to distinguish a person from a stone; when he runs, he goes indiscriminately against everything in his way, and passes over it or by the side of it, with equal indifference whether the obstacle be a piece of wood or an animal. His indifference in this respect is such that I should be inclined to attribute it only to his inexperience, to the continual slavery in which he had lived, and to the habit he had contracted of being touched and carried about in the hand from one place to another. But he never learnt to distinguish the hand that fed him, and remained as unfamiliar with the person who had the care of him, as with any other individual. In this respect I cannot compare him better than to the animals of the lower classes; yet there are even among the insects some which seem to have received the faculty of judging and of discriminating in a higher degree than this animal."—*Hist. des Mammif.*

We have observed the same habits, the same unceremonious manner of running against or over anything that stood in their way, whether a rabbit, or another of their own species, in specimens living at the Surrey Zoological Gardens. A smaller variety of *Dasypus mustelinus*, or a species nearly allied to it, has attracted considerable notice at the Gardens in the Regent's Park during the preceding year. The mode

of locomotion and the habits of these individuals were similar to those above mentioned. In their place of confinement it was extremely amusing to see the mock air of business with which they would run from corner to corner, suddenly stopping as if to listen, then scratching and rearing themselves up until generally they lost their balance and tumbled backwards in the straw; these actions they would repeat over and over again in the most mechanical manner, until the patience of the observer at length became exhausted.

These animals have brought forth more than once since they came into the possession of the Zoological Society: and it seems by no means improbable that they might be as readily naturalized as the guinea-pig. There is perhaps no quadruped more easy to transport: a little food, either animal or vegetable, and a little milk suffice for their nourishment, and they readily bear close confinement. And as the species require to be rigorously compared in order to determine the value of the characters that have been adopted to distinguish them, it is desirable that the facility with which they may be brought over should be generally known to those who make voyages from South America to Europe.

VIEW OF THE ANIMAL CREATION IN THE INTERIOR OF THE CAPE.

“ UPON the plains of the Sea-Cow River we fell in with springboks in countless troops, with hartebeests and bontéboks. Quachas from fifty to a hundred in a troop were hourly seen. The smaller kinds of game were also very plentiful. Hares were continually among the horses’ feet. Of this animal are four known species in or near the colony,—the common hare, the Cape hare, the mountain hare, and the red-rumped hare. Of the last, the exterior part of the thighs and its long tail are of a deep chestnut colour, and the ears are much shorter than in the others. Cape partridges and the Namanqua grouse were equally plentiful. The latter is a gregarious bird, and we usually met with it in large coveys near all the springs of water. So little were they intimidated at the approach of our people, that they suffered themselves to be knocked down with whips and sticks. A new species of korhaen or bustard was also seen here; it appeared to be something like the tetrix or French field duck, but was so very wild and scarce that not one of them could be procured. The Egyptian black ibis (*Tantalus niger*) and another species of tantalus, called by the farmers the haddadas, were

obtained at this place. The latter uttered the most horrid screams that can be imagined. I believe it has not yet been described. The beak is black ; the ridge of the upper mandible, and the upper part of the toes, red ; head, neck, and abdomen cinereous blue ; wing- and tail-feathers deep violet-blue ; back-feathers green, edged with dusky brown ; shoulders and covering feathers of the wings of a metallic lustre and iridescent. The mountain goose, the Egyptian goose, and the mountain duck were seen in considerable numbers. The last species answers to the description of the cana ; but there seems to be a mistake in giving the white head to the male, which is found only in the female. Several other aquatic birds were met with about the Sea-Cow River, attracted thinner, no doubt, by the vast quantities of fish that it contained. Of these, a species of *Cyprinus*, of a silvery colour, was the most common ; and we caught also a species of *Silurus*. The most remarkable of the birds were the *Platalea leucorodia* or white spoonbill, the great white pelican, and the flamingo. We saw also the common crane (*Grus*), the Numidian crane (*Virgo*), and the heron (*cinerea*) ; the bald ibis (*calvus*), the Cape curlew, and the common coot.

“In the neighbourhood of such places as are most frequented by graminivorous animals, the carnivorous tribe are, as might naturally be expected, the most abundant. The peasantry were however much surprised that no more than one lion had been seen by the party among the reedy banks of the Sea-Cow River, a part of the country that has at all times been considered as particularly infested by this animal, and where they are also of a much larger size, as well as of a fiercer temper, than those of the lower parts of the colony. The people of Sneuwberg are great sufferers from their frequent visits, particularly in their horses, to the flesh of which, after that of a hottentot, the lion seems to give a decided preference. The farmers here have a kind of dog that is not afraid to attack a lion, and it is said that instances have occurred wherein two of these together have been able to destroy him. This domestic animal is as large but not so strongly made as the Newfoundland dog, of a dark cinereous brown, with black and ferruginous stripes, a long straight tail, long pendulous ears, and spurious toes on the hind legs. Of tigers, as they are called in the colony, the peasantry distinguish two sorts, the tiger of the mountains, and the tiger of the plains. Of the first, the upper part of the body and exterior part of the legs are of a fallow ground, with irregular black spots, some circular, some lunated, and others ocellated ; in some parts distinct, in others running together in clusters ; the sides,

belly, and interior parts of the legs, a white ground, with large black circular spots; upper part of the tail fulvous, with oblong black spots; under part barred across with alternate black and white bands; vibrissæ or strong bristles about the mouth, silvery white; a black line along the fore part of the shoulders to the chest; length from the nose to the end of the tail seven feet four inches; length of the tail two feet ten inches. The description answers very nearly to that of the leopard, of which I believe it to be a variety only. The tiger of the plains is evidently of the same species, the only difference being in the size, which is a little larger than that of the former; and in the colour of the ground, which is a little lighter, both of which probably may arise from local circumstances. To another species of the feline tribe they give the name of leopard. It is not so long, but thicker, taller and much stronger than those described above; the colour is cinereous, with small black spots; the neck and temples covered with long crisp hair, like that of the mane of the lion; tail two feet, flat, vertical, spotted half way from the root, and the other half annulated; a thick black line from the interior angle of the eye extends to the opening of the mouth. Of this species we procured a young one; it became instantly tame, and as playful as the domestic kitten. Most beasts of prey, if taken young, may almost instantly be rendered tame. The fierce lion or the tiger is sooner reconciled to a state of domestication than the timid antelope; and the cadaverous crocuta, the wild dog, has lately been domesticated in the Snewberg, where it is now considered as one of the best hunters after game, and as faithful and diligent as any of the common sort of domestic dogs, yet in a state of nature there cannot possibly be a more savage animal.

“Birds, as well as beasts of prey, are attracted to all such places as abound with game. In the vicinity of the Sea-Cow River, vultures were more numerous than they had hitherto been seen in any part of the country. Of these we distinguished three sorts,—the large black condor, the percnopterus, or Egyptian sacred vulture, and a third species, that seemed to differ from the second only in size, being no more than two feet long. The female also of this bird, as well as that of the percnopterus, is distinguished from the whitish-coloured male by its plumage of dusky brown. This small species is called by the peasantry the White Crow. The Sacred Scavenger of Egypt meets not here with that protection which was afforded it on the banks of the Nile, where, according to Herodotus, to destroy it was a capital crime. The percnopterus is a gregarious bird, and is usually seen in flocks,

that rarely consist of fewer than fifty ; and they are generally attended with two or three condors, as many of the small white kind above mentioned, and a whole flock of the vulture-crow. An animal is no sooner shot than these birds appear hovering at an immense height in the air, from whence they plunge down the moment that the carcase is left alone. It has often been a subject of astonishment to me, from whence they could so instantaneously collect themselves in a body to souse upon their prey ; but at the same time it convinced me of the accuracy of Pliny's observation, where he says that vultures are accustomed to hover about a place two or three days before the death of a diseased animal, and that they have a presentiment when and at what time a carcase will be found."

—*Barrow's Travels in Africa*, vol. i. p. 223.

ON THE HABITS OF THE BLACK SKIMMER OR SHEERWATER
(*RHYNCOPS NIGRA*, LINN.).

[From Wilson's "American Ornithology."]

"THIS truly singular fowl is the only species of its tribe hitherto discovered. Like many others, it is a bird of passage in the United States, and makes its first appearance on the shores of New Jersey early in May. It resides there, as well as along the whole Atlantic coast, during the summer, and retires early in September. * * * * He is found on various coasts of Asia as well as America, residing principally near the tropics, and migrating into the temperate regions of the globe, only for the purpose of rearing his young. * * *

"The singular conformation of the bill of this bird has excited much surprise ; and some writers, measuring the divine proportions of nature by their own contracted standards of conception, in the plenitude of their vanity, have pronounced it to be 'a lame and defective weapon.' Such ignorant presumption, or rather impiety, ought to hide its head in the dust on a calm display of the peculiar construction of this singular bird, and the wisdom by which it is so admirably adapted to the purposes or mode of existence for which it was intended. The Sheerwater is formed for skimming, while on wing, the surface of the sea for its food, which consists of small fish, shrimps, young fry, &c., whose usual haunts are near the shore and towards the surface. That the lower mandible, when dipt into and cleaving the water, might not retard the bird's way, it is thinned and sharpened like the blade of a knife ; the upper mandible, being at such times elevated

above water, is curtailed in its length, as being less necessary, but tapering gradually to a point, that on shutting it may offer less opposition. (The length of the upper mandible is three inches and a half; that of the lower four and a half.) To prevent inconvenience from the rushing of the water, the mouth is confined to the mere opening of the gullet; which, indeed, prevents mastication taking place there, but the stomach or gizzard, to which this business is solely allotted, is of uncommon hardness, strength, and muscularity, far surpassing in these respects any other water bird with which I am acquainted. To all these is added a vast expansion of wing, to enable the bird to sail with sufficient celerity while dipping in the water. The general proportion of the length of our swiftest hawks and swallows to their breadth is as one to two; but in the present case, as there is not only the resistance of the air but also that of the water to overcome, a still greater volume of wing is given,—the Sheerwater measuring nineteen inches in length and upwards of forty-four in extent*. In short, whoever has attentively examined this curious apparatus, and observed the possessor with his ample wings, long bending neck, and lower mandible occasionally dipt into and ploughing the surface, and the facility with which he procures his food, cannot but consider it a mere playful amusement, when compared with the dashing immersions of the tern, the gull, or the fish-hawk, who, to the superficial observer, appear so superiorly accommodated.”

ANECDOTE OF A PERSIAN GREYHOUND†.

[From Sir Robert Kerr Porter's Travels in Georgia, Persia, &c.]

“ At this point of my journal I cannot refrain from mentioning an instance of uncommon sagacity in a greyhound of our company; that sort of dog not, in general, being celebrated for anything beside fleetness in the chase. Soon after we had advanced into the uneven country, by some negligence or other, the horse-keeper allowed a fine spirited animal he was leading to break away. The horse set off at speed up the hills; and, from the darkness of the night, and the few people I could spare to pursue, I at first despaired of his re-

* The wandering albatross (*Diomedea exulans*.) measures in length nearly four feet, and in extent about ten feet or upwards (Shaw's Zoology); nearly the same proportions as those of the sheerwater.

† A fine specimen of this elegant, and, as it appears, sagacious and courageous variety of dog, may be seen at the Zoological Gardens, Regent's Park.

very. But the dog, on the instant he perceived the animal loose, headed him at every turn ; and, at length, after a long run, succeeded in catching the end of the halter, and retaining it in his mouth; holding it firm, while the superior strength of the horse dragged him onward ; and then, pulling him in his turn, endeavoured to arrest the fugitive's pace, during his bounds and sudden freaks ; which effort of the dog's, so far impeded the animal's flight, as, at last, to allow one of my servants to seize him. A British bull-dog could not have shown more determination, or strength of mouth, at the nose of a bull, than was evinced by my slightly made Persian greyhound, Cooley (the spotted,) in his contest with this strong and very highly mettled horse."—Vol. i. p. 444.

OBSERVATIONS ON THE MARMOT.

[Translated from the *Bibliothèque Universelle*, by J. E. T.]

" HAVING, in the winter of 1830, undertaken some experiments on the hibernation of animals, I exposed four young marmots to a temperature of from 10° to 12° R. below zero. But this cold, which was perhaps too intense to determine their numbness, put them into a state of trouble, which lasted until I restored them to a temperature of 7° to 8° R*. My marmots then fell asleep, with the exception of one, which escaped secretly from the room where I was making my observations. I searched for it in every adjoining place, but in vain ; when, after the lapse of a fortnight, a servant, on entering a deep cellar beneath my house, felt such a resistance at the door, in trying to push it open, that she could not succeed in forcing it back. She instantly came to me; expressing her fear that some ill-disposed person had secreted himself in the cellar. I went to the spot with some friends who chanced to be with me at the time ; but what was our astonishment, on forcing open the door, at finding that the marmot which I had imagined to have been lost, had possessed himself of this lodging ! The animal had found an entrance by a small opening in the vault, and wishing to secure for itself an impenetrable retreat, we noticed that it had dug up the earth and scraped the wall, in order to heap up the mould and plaster against the door, to about the height

* Dr. Marshall Hall observes, in a valuable paper on Hybernation in the last Part of the Philosophical Transactions, that " to induce true hibernation, it is quite necessary to avoid extreme cold ; otherwise we produce the benumbed and stiffened condition to which the term torpor or

of two feet; and by a still further foresight, perceiving an aperture below the door of two or three inches, it had taken the precaution, before heaping up the earth and plaster, to fix against this space a piece of board, which it had detached from a shelf. Our marmot had then untied a straw rope which enveloped twenty bottles, with which it formed a bed from eight to ten inches thick, in a corner of the cellar; and afterwards, to protect itself apparently from the annoyance of the rats, the industrious animal had broken several bottles, and formed, with the greatest regularity, a half circle of the broken pieces of glass, before its bed. Unhappily, my servant roused it too hastily, and in attempting to seize it, inflicted on it a mortal wound, which thus deprived me of the pleasure I should have had of studying, in this animal, habits which result from an instinct in the marmot, more perfect than its apparent stupidity seems to indicate."

Our correspondent adds:—This mention of the marmot reminds me of a singular spot I visited in the course of a tour last summer amongst the Alps, which is a favourite resort of these animals. During a stay at Chamounix, I made an excursion, in company with some friends, to the "Jardin," a spot situated at several leagues across the Mer de Glace. The name is given to a patch of rocks which rise in the midst of a wide plain of snow, forming a horse-shoe basin of considerable extent, and inclosed on all sides but at one opening, by a circle of the highest Alps. This spot is situated at a height of about 9000 feet, and its chief interest arises from its forming an insulated patch of verdure in the midst of a region of sterility and snows,—an oasis of spring in a desert of winter. While resting there, on a rich bed of turf and flowers, we looked around in vain for any other appearance of life or vegetation. The eye stretched across this plain of snows to the gray craggy mountains which rose around us; or still further, through the opening of this amphitheatre, across the valley of the Mer de Glace, for several leagues, to the smooth dome of snows of Mont Blanc. The marmots burrow in these rocks in great numbers. They come out in wet weather, and towards evening, and may frequently be heard in their burrows, especially on the approach of rain, making a shrill and peculiar whistle, by imitating which, and remaining quiet on the ground, they may be attracted from their holes. The weather was fine and dry when we visited this spot, and we neither heard nor saw anything of them; and our guides predicted from this circumstance a continuance of good weather.

THE ZOOLOGICAL GARDENS.

THE preparation of the ground lately added to the gardens in the Regent's Park is now approaching to a completion. It appears to have been laid out with great taste and judgement, and we may venture to assert that in the ensuing summer this delightful establishment will be more attractive than ever.

Among the rarities of the menagerie may be noticed in the parrot-room a large and handsome bird from New Holland, called the Laughing King-fisher (*Dacelo gigantea*), and a singular species of lizard with the tail beset with a kind of spiny armour (*Uromastyx*).

The establishment at Brighton on the plan of the Zoological Gardens in London is now broken up, the speculation not having succeeded. We have received from our valuable correspondent W. C. of Liverpool the following account of a spirited undertaking of a similar kind at that place. "Atkins has taken a large piece of ground, about eight acres, or more; part of it has been an old marl quarry, and presents a great undulation of surface. He has employed the first architects here for the plans, &c., and is really doing things in style. Several of his friends interested in the cause have talked about funds to him, but at present there is no want; he has £30,000, he says, ready if needed. Animals are cheap here, and many will be given. The grounds are planted very well with trees and shrubs of all descriptions, and about May it will be opened. The elephant-house is quite ready. He has the tiger-lions of which you have heard, and, as far as I can learn, his collection is good: his situation though on high ground is central, about half way from the two ends of the town."

CHARACTERS OF THE PANTHER.

[From a Correspondent.]

THE interesting communication of W. H. S. relative to the Panther was received just as our last sheet was going to press, and we regret that it did not reach us earlier in the month.

torpidity may be appropriated. I have even observed that methods which secure moderation in temperature, lead to hibernation: hedgehogs supplied with hay or straw; and dormice, supplied with cotton wool, make themselves nests and become lethargic; when others, to which these materials are denied, and which are consequently more exposed to the cold, remain in a state of activity. In these cases, warmth or moderated cold actually concur to produce hibernation."

Our Correspondent observes, " M. Temminck, M. Lesson, and the translators of the *Règne Animal* agree that the coat of the leopard is of a lighter shade of tawny, and a greater quantity of the ground colour is visible, than in the panther; in the former also the black rings are more broken, giving the animal a somewhat dotted appearance. The panther, on the contrary, has less of the ground colour visible, a deeper shade of tawny, the rings more closely approximated and much less broken. Indeed in some specimens I have seen from the same localities with the more common kind, the crowding of the black rings and the darkness of the tawny have given the skins a blackish hue. But with respect to the above general characters, I can testify that they are sufficiently unvarying to be good specific guides. I may add that the leopard, although taller, is comparatively less bulky than the panther, stands higher on its legs, and has them less robust; the chest is deeper and narrower, and the loins proportionally smaller." With this testimony as to the validity of the specific distinction afforded by the outward markings of the skin we should have gladly received a confirmation also of the remarkable character pointed out by M. Temminck as existing in the comparative length and the number of the bones of the tail. Perhaps our valued correspondent would enable us to add his observations on this particular to the remainder of his present communication, in a future Number. We thank him for his good wishes, and shall avail ourselves of his suggestions.—*Ed.*

ZOOLOGIST'S CALENDAR FOR APRIL.

As the genial season approaches, the animal world seems invigorated with new life; additional species daily crowd upon our observation, and the work of creation is, as it were, performed anew.

To enumerate every varied form of bird and insect that successively presents itself would extend this catalogue to a tedious length, and be little more than a repetition of what has been already given in other works. We shall therefore confine our notice to a few of the more interesting objects that now claim the attention of the naturalist.

This month affords the best opportunities for distinguishing the short-winged summer birds before the trees have put on their full summer foliage, and prior to the commencement of the breeding season. Their arrival, however, is consider-

ably influenced by the weather, and will be delayed if the season should continue severe and turbulent.

Among the few carnivorous quadrupeds that live wild in this country, the fox (*Canis Vulpes*), the pole-cat (*Mustela Putorius*), and the martin (*Martes fagorum*), suckle their young.

When the mild weather has set in, the sibilous note of the grasshopper lark (*Sylvia Locustella*, Lath.) may be heard in the fields. This bird simulates so closely the noise of a grasshopper as readily to deceive an unpractised ear. "Nothing can be more amusing," says the delightful historian of Selbourne, "than the whisper of this little bird, which seems to be close by, though at an hundred yards distance, and when close to your ear is scarce any louder than a great way off."

Our other visitors are the white-breasted warbler (*Curruca garrula*), the white-throat (*Curruca cinerea*), the sedge-bird (*Curruca salicaria*), the wry-neck (*Yunx Torquilla*), the black-cap (*Sylvia Atricapilla*), the redstart (*Sylvia Phoenicurus*), the whinchat (*Saxicola Rubeta*), the pied flycatcher (*Muscicapa luctuosa*), the chimney-swallow (*Hirundo rustica*), the bank-swallow (*Hirundo ruparia*), the ring blackbird (*Merula torquata*), the quail (*Coturnix major*), the turtle-dove (*Columba Turtur*), the stone curlew (*Œdicnemus crepitans*), the ruff (*Tringa pugnax*); the notes of the cuckoo and nightingale may perhaps be heard, and the rare stilt-bird (*Himantopus melanopterus*) may occasionally be seen at the end of this month. They migrate hither from the South of Europe, and according to Hasselquist from Egypt.

The birds which build and hatch in April are, the golden-crested wren (*Regulus cristatus*), which makes a hanging nest; the red-breast (*Sylvia Rubecula*), the wood-lark (*Alauda arborea*), the missel thrush (*Turdus viscivorus*), the chick-stone (*Saxicola Rubecula*), the linnet (*Fringilla Canabrina*), the kingfisher (*Alcedo Ispida*), the lapwing (*Vanellus cristatus*), the black cock (*Tetrao Tetrix*), the shear-water (*Procellaria Puffinus*).

Those who keep in their gardens the common tortoise, may expect him to come forth from his winter's grave in the warmer period of this month. He is observed to make a little breathing hole as a preliminary step before emerging. He buries himself about November.

The frog (*Rana temporaria*), the toad (*Bufo vulgaris*), the natter-jack (*Bufo Rubeta*), and the eft (*Triton palustris*), all spawn early in the month.





THE FUSCATED KANGAROO.

THE
ZOOLOGICAL MAGAZINE.

THE FASCIATED KANGAROO, (*Halmaturus fasciatus*, Cuv.)

THE organic productions of Australia, whether vegetable or animal, have for the most part characters so peculiar to themselves, that they seem rather to have been contemporaneous with the fossilized relics of the older strata, than with the animated productions of the present period; and to have escaped those revolutions which have changed the surface of the rest of the globe.

Among the quadrupeds especially, the most remarkable modifications of form and structure have been discovered,—of which, after the Duck-billed Platypus and the Porcupine Ant-eater, we may consider the Kangaroo as presenting one of the most striking examples.

The first discovery of this singular animal was made in 1770, during the period in which our celebrated navigator Captain Cook was exploring that part of the coast of Australia which is now called New South Wales.

“ On Friday, June 22nd, (he says,) a party who were engaged in shooting pigeons for the use of the sick of the ship, saw an animal which they described to be as large as a greyhound, of a slender make, of a mouse-colour, and extremely swift.” The following day the same kind of animal was again seen by a great many other people. On the 24th it was seen by Capt. Cook himself, who, walking at a little distance from the shore, observed a quadruped, which he thought bore some resemblance to a greyhound, and was of a light mouse-colour, with a long tail, and which he should have taken for a kind of wild dog, had not its extraordinary manner of leaping, instead of running, convinced him of the contrary. Sir Joseph (then Mr.) Banks, whose association with Capt. Cook rendered that voyage so peculiarly fortunate for the interests of natural history, having obtained a transient view of it, immediately concluded it to be an animal perfectly new and undescribed.

On the 17th of July, this gentleman, accompanied by a small party, went out at dawn of day in quest of discoveries in natural history; and, in a walk of many miles, at length saw four of these animals, two of which were chased by his greyhound, but readily outstripped their pursuer, and threw him out to a great distance, by leaping over the long grass,

which prevented the dog from running to advantage. All that could then be distinctly observed was, that the animal in some degree resembled the Jerboa in its manner of springing forward on the hind legs, instead of running in the manner of other quadrupeds.

The sight of a creature so extraordinary could not fail to excite, in the mind of a philosophic observer, the most ardent wishes for a complete examination. These were at length gratified; Mr. Gore, one of the associates in the expedition of Capt. Cook, having been so fortunate as to shoot one in the course of a few days, and it seems to have been from this specimen that the figure given in Hawksworth's *Voyage* was drawn.

The term Kangaroo is borrowed from the natives of Australia; and the last syllable of this word, it may be observed, seems to be a generic appellative signifying 'quadruped' or 'beast,' for we find it again in *Poto-roo*, by which they designated the Kangaroo Rat; *Wha-tapoa-roo*, the native name for the Lemurine Opossum; and in *Hepoona-roo*, the native name of the *Petaurus* or Flying Opossum.

The labours and researches of modern naturalists have been repaid by the discovery of several other species of kangaroo, in addition to the large one first seen and described. One of the most elegant of the species is the banded kangaroo discovered by the French naturalists Péron and Le Sueur, from whose figure we have copied the illustration prefixed to this article.

All these animals are remarkable for the extreme disproportion subsisting between their fore and hind extremities. One might almost say that the whole of the upper part of the body had been in some measure sacrificed to the lower: the hinder limbs possess an astonishing power, from their bulk and length; while the tail, from its thickness and the strength of its muscles, seems, as it were, to form a fifth extremity. The fore legs on the contrary are very slim and small; the neck tapers to the head, which is itself small and tapering. This conformation permits them to assume and maintain the erect position, during which the tail forms with the hind legs a firm tripod, or basis of support, the disarrangement of whose equilibrium is little risked by the lightness of the superincumbent parts; and the kangaroo in this position derives additional support and stability from the length of its feet,—a peculiarity from which the generic term *Macropus* is derived. The fore feet are armed with five strong claws, which are of a three-sided figure, with a flat surface below, and slightly arched; the toes are very free and moveable, and thus adapted in some degree for grasping. The hind feet have only four toes, the two innermost of which are rudimentary, and enve-

loped in a single sheath of skin as far as the claws, which are small, curved and distinct; the next toe is very large and long, armed with a very powerful sharp-pointed claw, or rather elongated hoof, with which the kangaroo can inflict very severe wounds: the outer toe is almost as strong as the preceding; but is shorter and its claw somewhat weaker: the under surface of the foot is naked as far as the projecting heel or hock; the leg is twice the length of the thigh. The hair of the kangaroo is of two kinds, silky and woolly; the first kind is only found on the limbs, the head, and the tail, whilst the woolly hair covers all the rest of the body; a few short black stiff bristles appear on the upper lip, the eyebrows, and beneath the eyes and the throat. The eyes are large with a mild expression, the pupils large and round; the ears are of a moderate size and simple structure; the nostrils are patulous and surrounded by a hair-clad skin; the tongue is smooth; and the upper lip divided, like that of the hare or rabbit.

The dentition of the kangaroo presents a combination of characters from the Rodent, the Ruminant, and the Pachydermatous orders. Laniaries or tusks are wanting: the incisors are six in number in the upper jaw, and two only in the lower jaw; they are separated from the molaries by a wide space. The upper incisors are in contact with each other, disposed in a curved line, short, flat and trenchant: the lower ones are large, straight, somewhat flattened, pointed, closely approximated to each other, and lying parallel to the plane of the jaw, or directed straight forwards. The molaries are in some four, in others five, on either side of either jaw; the first is of a compressed form, with a trenchant and slightly serrate crown; this is shed in some of the species, while in others it is retained, which gives rise to the difference in number just mentioned; the other four have square crowns, formed of two transverse ridges, united at their base by a projection, but leaving a simple flattened surface when worn down by attrition. They are herbivorous animals, generally living in small troops under the guidance of an old male, frequenting the wooded regions of Australia, but readily propagating in our climate; and since their flesh is esteemed for its flavour, they might form a useful addition to our stock of domesticated animals, as well as an ornament to our parks and forests.

They appear to be a very hardy race: the naturalists who accompanied M. Freycinet relate that in the sterile region of the Bay of Seals, where there is an absolute want of fresh water, the kangaroos still find a subsistence, and satisfy their thirst with sea-water. On board ship, although from their digestive system essentially herbivorous, yet they would eat any kind of viand, as bread, sugar, and even salt-beef, or old

leather, &c.; they would also drink wine or brandy. We have heard that advantage has occasionally been taken of this aptitude to drink intoxicating liquors, to occasion the ludicrous spectacle of their singular modes of progressive motion as modified by a state of inebriation.

In their more leisurely motions as quadrupeds, with the four legs on the ground, they raise the hinder part of the body by making use of their tail as a prop or support, then carrying the hind legs past the fore legs they rest them on the ground, and simultaneously throw forward the fore legs and the tail; on which again the body is supported while the hind legs are again brought forward, &c.—but when pushed to a swifter motion, they make leaps of from twenty to thirty feet in extent, and from six to nine in height, clearing the obstacles which impede their less gifted pursuers, and using the tail as an essential instrument in this vigorous species of locomotion.

The kangaroo is hunted by the colonists with a strong race of dog, partaking of the qualities of the greyhound and stag-hound; it is observed, when hard pressed by these pursuers in the open plains, not to use the saltatory mode of progression, but to run on its four legs, leaping only when it has an obstacle to overcome; for it appears that the tail cannot be brought with sufficient rapidity into the position necessary for the performance of its part in the leap, to enable the kangaroo to escape by this means when on level and unobstructed ground. The chase is not without its dangers to the dogs. The kangaroos inflict stunning blows with their heavy and muscular tail; the kick from the hind leg is often fatal, and always inflicts a severe wound; the strong males will also grapple with the dog, and whilst they hold it fast in the fore paws they will tear open the belly of their enemy with the strong hinder claws.

The genus *Macropus* has been divided into two groups, from differences in the form of the nose. In one of the divisions, there is only a very small naked and glandular border over each nostril; in the other group, this glandular circle is remarkably developed, and is divided in the middle by a little furrow.

To the first of these divisions belong the Kangaroos, properly so called,—animals remarkable for their great size; their long, conical head; and their large, oval, villous ears; they have, besides, their fore legs longer, and their tail for the most part shorter and stronger than the species included in the second group. They are all peculiar to New Holland, and the species are difficult to determine, the distinctive characters resting chiefly on slight differences of the fur, which differences seem also to pass by a series of gradations or shades into one another. The only species known to Dr.

Shaw was the large one he describes under the specific name *Macropus major*, and which was termed by Gmelin *Didelphis gigantea*.

The species at present characterized which belong to the first group, are: the great or brown kangaroo, *Macropus major*; the woolly kangaroo, *Macr. laniger*, Quoy and Gaimard; the mustachioed kangaroo, *Macr. barbatus*, Geoff.; the Banksian kangaroo, *Macr. Banksianus*, Lesson; the grey-red kangaroo, *Macr. rufogriseus*, Geoff.; the vinous kangaroo, *Macr. vinosus*, Geoff.?; the red-necked kangaroo, *Macr. ruficollis*, Geoff.; the Eugene kangaroo, *Macr. Eugenii*, Lesson.

The kangaroos of the second family are of less size, with a shorter and larger head; the ears shorter, and of a rounder form; the fore legs much smaller, and the tail for the most part longer and more slender. The generic name *Halmaturus*, originally proposed by Iliger for the whole genus, has been applied exclusively to this group by Fred. Cuvier.

One of the species (*Macropus Brunii*) has long been known to naturalists, and is figured by Schreber under the title of *Didelphis Brunii*; it inhabits the Island of Aru, New Guinea, and is about the size of a hare: the remainder of the species have been more recently added to science. These are the *Macropus (Halmaturus) Thetidis* of Geoffroy: the *Macr. (Halmaturus) Billardieri* of Lesson. The silver or bush kangaroo was first described by Mr. Lambert in the Linnean Transactions, from a specimen in Pidcock's Menagerie at Exeter 'Change. "It is," he says, "one of the most elegant animals I ever saw:" he was informed by Mr. White that its habits were very different from those of the common kangaroo, it being always found solitary, whereas the other is found in herds of forty or fifty together. From its light and beautiful figure and graceful deportment, this species was named *Macropus elegans*.

In all the qualities, however, which induced Mr. Lambert to give it the above specific name, the bush kangaroo is far exceeded by the species whose figure we have given in the present Number, viz. the Fasciated Kangaroo (*Macropus fasciatus*,) of Péron and Le Sueur. Its discoverers describe it as the smallest and most elegant species of the extraordinary genus of quadrupeds described in this article. It is scarcely so large as a rabbit, and is easily distinguishable from all the other known species by twelve or fifteen bands disposed transversely across the back; these bands are narrow, of a reddish brown colour, less regular and decided over the shoulders, where they commence, but becoming more distinct and of a deeper brown as they descend towards the tail, at the base of which they terminate. The bands are gradually lost on the sides of

the body, and no trace of them can be perceived at the under part. The head and the feet of a light yellow colour; the under part of the body is of a clear grey approaching to white; the rest of the body is the colour of a hare, more or less deep in different individuals. The ears in this species are proportionately shorter than in any other; it is the same with respect to the tail, which, being deprived of hair, presents considerable resemblance to that of a very large rat. In other respects, the pyramidal form of the body, the disproportionate size of the hind legs, the disposition and proportions of the toes and claws, are the same as in other kangaroos.

The banded or fasciated kangaroo inhabits the three islands called after *Bernier*, *Doore* and *Dirk-Hattraich*, and has not been met with on the continent of Australia, or in any other of the islands which the French naturalists successively touched at. They also remark that the other species of kangaroo seem to be confined to a similarly limited range of country; to be fixed by nature to such and such islands, without any individual appearing to break the limits assigned to its species. The smaller species of kangaroo, being comparatively deprived of any means of attack or defence, resemble, in their gentle and timid character, the hares and other feeble quadrupeds of our own climates. The slightest noise alarms them; a breath of wind agitating the bushes is sufficient to put them to flight. On this account, notwithstanding their great abundance at the Island of Bernier, their capture was extremely difficult and precarious. Concealed and defended by the impenetrable jungles, these animals were enabled to brave with impunity the craft and activity of their pursuers. When driven at last from these asylums, they escaped by unknown routes, and darted rapidly across the open space to some neighbouring bush, through the inextricable intertexture of which it seemed inconceivable how these delicate creatures could force a passage; but, upon a closer examination, it was found that they had formed in every bush many little covered ways, commencing at different parts of the circumference, and leading to the centre of the jungle, from which, when attacked, they could select an outlet from among numerous different routes. But these attempts at escape were mostly fatal to them when the outlets were once discovered; as, in that case, the hunters stationed themselves in readiness to knock down the affrighted animals, while others beat the bushes with long staves, to scare them from their hiding-place. To the French naturalists above mentioned, the flavour of these animals resembled that of the hare, but was more aromatic, in consequence of the peculiar nature of the plants on which they fed, which were all of an odoriferous kind. They assert that this species affords by far

the best food of any of the kangaroo kind, and strongly recommend its introduction into Europe, both on that ground, as well as its beauty.

“ At the period,” they observe, “ when we were on these coasts, all the full-grown females had in their pouch a tolerably sized young one, which they strove to defend and preserve with an admirable degree of courage. When wounded, they fled, bearing along their young one in the pouch, and did not abandon it until being overcome with fatigue, and exhausted by loss of blood, they were unable any longer to carry it; then they would stop, and sitting upright on their hind legs, would assist the young one out of the pouch with their fore legs, and endeavour, as it were, to direct it to the place where it could find the most easy means of escape. Thus disembarrassed, they would then continue their flight with as much rapidity as their powers would permit; but if the pursuit was given over or slackened, they would then be seen to return to the bush which protected their young; to call them by a sort of grunt peculiar to them; and, on their return, affectionately to caress them as if to dissipate their alarm, again to receive them in the pouch, and to seek, with their beloved burthen, some other jungle remote from the persecution of the hunter. Similar proofs of intelligence and affection, but still more touching, were exhibited by the poor mothers when they felt themselves mortally wounded; all their cares were then directed to the safety of their offspring; far from seeking to save themselves, they would stand still beneath the blows of the hunter, and their last efforts would be given to the preservation of their young. Generous devotion! of which the history of animals offers so many examples, and which we are often reduced to envy.

“ During our sojourn at the Island of Bernier, we took several of these young kangaroos; they were, however, too feeble, and survived their captivity but a short time. One alone lived and became tame: this animal ate bread with readiness, and was particularly fond of the sugared water which was offered to it. This last taste seems the more extraordinary, as, in the desert islands which these animals inhabit, every kind of fresh water is constantly wanting. This young kangaroo was killed accidentally at Timor: we felt its loss the less sensibly, because, having but one, we could not hope to have naturalized it in Europe; but this first attempt is enough to prove with certainty, that this species can accommodate itself very readily to the cares and society of man; and we repeat, that it would be a valuable acquisition for our parks and pleasure-grounds.”

The pouch above mentioned, which Nature has given the

kangaroo for the defence and shelter of her offspring, is not confined to this genus, but is found in females of all the quadrupeds of New Holland, with the exception of the native dog, a species of water-rat, the paradoxical platypus, and the porcupine ant-eater; the two latter have, however, the peculiar bones which, from a supposition of their supporting the pouch, have been termed by anatomists the marsupial bones. The naturalist has borrowed a term from the same source to designate the animals endowed with this abdominal bag; and all the great Australian family of quadrupeds, together with the opossums of America, are included by Cuvier in an order called *Marsupiata*, marsupial or pouched animals. The young in all this tribe are received into the pouch when of an extremely minute size, and there acquire, as in a second womb, their principal growth. It was from this peculiarity that Linnaeus gave to the genus most anciently known, the epithet *Didelphis*. The peculiarity of this mode of generation has rendered it a subject of great interest in a scientific point of view.

Some of the particulars that have been noticed may be briefly alluded to. The Count Aboville attentively watched a pair of opossums which he kept in his house. On the fifteenth day of gestation he found, on introducing his finger into the pouch, a round body of the size of a pea; on the seventeenth day he could detect two similarly formed bodies; on the sixtieth day a number of young ones could be seen in the pouch, hanging from the teats.

Dr. Barton, an American physician, has observed that the young opossum is born without form, a mere gelatinous mass, without trace of eyes or ears, weighing not more than a single grain, though coming from a parent as large as a cat. These germs adhere to the nipple, and grow from thence without quitting it till they attain the size of a rat; they then return to the pouch for the purposes of suckling, or when they require shelter. According to him, uterine gestation lasts from twenty-two to twenty-six days.

M. Rengger also states, that the gestation of the opossum, observed in a species he has termed *Didelphis Azaræ*, lasts twenty-five days; but according to this author, the young, when they are received into the pouch, are half an inch in length, naked, with the head very large, the eyes closed, the nostrils and the mouth open, the ears folded, the fore- and hind-legs crossed in front of the body, and the tail turned towards the same part. In this state, they manifest no signs of life when touched or irritated. Shortly after birth, they are found suspended by the mouth to the nipples, but without being coherent with them. They remain attached to the

nipples seven weeks, when their eyes are for the first time opened; they then begin to quit the pouch,—a sort of second birth; and afterwards return to it at intervals for nourishment and protection.

The period of gestation in the kangaroo is not yet ascertained, but the young is received into the marsupium or external pouch when of very small size. Sir Everard Home found one attached to the nipple, which weighed twenty-one grains, and measured an inch without the tail; its fore-paws were tolerably well formed, and double the length of the hind ones. "When the young," he observes, "is first attached to the nipple, the face appears to be wanting, except a round hole at the muzzle, to which the nipple is applied and adheres; soon after, the lips and jaws grow upon the nipple, till at last nearly half an inch of its length is inclosed in the mouth."

According to some notes made by a keeper on a kangaroo which belonged to the Duchess of Berri, it would appear that gestation had continued from the 6th of May to the 6th of October, viz. five months; and that the young one remained in the pouch till the January following, when it quitted the nipple and came out. The exact period, however, of gestation in the kangaroo, the form and condition of the embryo at birth, and the precise manner in which it passes or is conveyed into the pouch, are points which still remain to be decided.

AFFECTION OF INSECTS FOR THEIR YOUNG.

THE affection displayed by insects for their young, and the industry and perseverance with which they labour to provide for them, have frequently been the subject of interesting observations and remarks by different naturalists.

This subject has been very ably treated in that well-known and valuable work the 'Introduction to Entomology' of Kirby and Spence; and amongst other instances they refer to an account of a singular species of the beetle (*Necrophorus Vespillo*, F.) first noticed by M. Gleditsch in the Acts of the Berlin Society for 1752. He begins by stating that he had often remarked that dead moles, when laid upon the ground, especially if upon loose earth, were almost sure to disappear in the course of two or three days, often of twelve hours. To ascertain the cause, he placed a mole upon one of the beds in his garden. It had vanished by the third morning; and on digging where it had been laid, he found it buried to the depth of three inches, and under it, four beetles which seemed to have been the agents in this singular inhumation. Not perceiving anything particular in the mole, he buried it again;

and on examining it again at the end of six days, he found it swarming with maggots apparently the issue of the beetles, which, M. Gleditsch now naturally concluded had buried the carcase for the food of their future young. To determine these points more clearly, he put four of these insects into a glass vessel half filled with earth, and properly secured, and upon the surface of the earth two frogs. In less than twelve hours one of the frogs was interred by two of the beetles : the other ran about the whole day as if busied in measuring the dimensions of the remaining corpse, which, on the third day, was also found buried. He then introduced a dead linnet. A pair of the beetles were soon engaged upon the bird. They began their operations by pushing out the earth from under the body so as to form a cavity for its reception ; and it was curious to see the efforts which the beetles made by dragging at the feathers of the bird from below to pull it into its grave. The male having driven the female away, continued the work alone for five hours. He lifted up the bird, changed its place, turned it and arranged it in the grave, and from time to time came out of the hole, mounted upon it, and trod it under foot, and then retired below and pulled it down. At length, apparently wearied with this uninterrupted labour, it came forth and leaned its head upon the earth beside the bird, without the smallest motion, as if to rest itself, for a full hour, when it again crept under the earth. The next day, in the morning, the bird was an inch and a half under ground, and the trench remained open the whole day, the corpse seeming as if laid out upon a bier, surrounded with a rampart of mould. In the evening it had sunk half an inch lower, and in another day the work was completed and the bird covered. M. Gleditsch continued to add other small dead animals, which were all, sooner or later, buried ; and the result of this experiment was, that in fifty days four beetles had interred, in the very small space of earth allotted to them, twelve carcases, viz. four frogs, three small birds, two fishes, one mole and two grasshoppers, besides the entrails of a fish and two morsels of the lungs of an ox. In another experiment a single beetle buried a mole forty times its own bulk and weight in two days. It is plain that all this labour is incurred for the sake of placing in security the future young of these industrious insects along with a necessary provision of food. One mole would have sufficed a long time for the repast of the beetles themselves, and they could have more conveniently fed upon it above ground than below. But if they had left thus exposed the carcase in which their eggs were deposited, both would have been exposed to the imminent risk of being destroyed at a mouthful by the first fox or kite that chanced to espy them.

THE LOCUST.

DR. CLARKE in his Travels in Tartary, on approaching Cuffa, thus notices the number of locusts.

" We now began to perceive the truth of those surprising relations which we had often heard and read concerning the locust in countries infested with that insect. The *steppes* were entirely covered by their bodies ; and their numbers falling, resembled flakes of snow, carried obliquely by the wind, and spreading a thick mist over the sun. Myriads fell over the carriage, the horses and the drivers. The stories of these animals, told us by the Tartars, were more marvellous than any we had before heard. They said that instances had occurred of persons being suffocated by a fall of locusts in the *steppes*. It was now the season, they further added, in which their numbers began to diminish. When they first make their appearance, a thick dark cloud is seen very high in the air, which, as it passes, obscures the sun. I had always supposed the stories of the locust to exaggerate their real appearance ; but found their swarms so astonishing in all the *steppes* over which we passed in this part of our journey, that the whole face of nature might have been described as concealed by a living veil. They were of two kinds ; the *Gryllus Tartaricus*, and the *Gryllus migratorius* or common migratory locust. The first is almost twice the size of the second, and since it precedes the other, bears the name of the Herald or Messenger. The migratory locust has red legs, and its inferior wings have a lively red colour, which gives a bright fiery appearance to the animal when fluttering in the sun's rays. The strength of limbs possessed by it is amazing : when pressed down by the hand upon a table, it has almost power to raise the fingers ; but this force resides wholly in the legs ; for if one of these be broken off, which happens by the slightest accident, the power of action ceases. There is yet a third variety of locust, *Gryllus viridissimus* of Linnæus, found near the Don and the Kuban, which is entirely of a green colour. This last I have since seen upon the banks of the Cam in my own country, and felt for the moment intimidated, lest such a presage should be the herald of the dreadful scourge which the locust bears wherever it abounds. On whatever spot these animals fall, the whole vegetable produce disappears. Nothing escapes them, from the leaves of the forest to the herbs of the plain. Fields, vineyards, gardens, pasture, everything is laid waste ; and sometimes the only appearance left upon the naked soil is a disgusting superficies caused by their putrifying bodies, the stench of which is sufficient to breed a pestilence."

FECUNDITY OF THE SEA TURTLE.

[From 'Travels in Brazil,' by Prince Maximilian, p. 190.]

" WHILE our people were employed in fetching some sea-water, and in picking up drift-wood on the beach, we found to our great surprise, at a short distance from our fire, a prodigious sea-turtle (*Testudo Mydas*, Linn.) which was just going to deposit its eggs : nothing could be more welcome to our hungry company ; the animal seemed to have come expressly to provide us with a supper. Our presence did not disturb it ; we could touch it, and even lift it up ; but to do this it required the united strength of four men. Notwithstanding all our exclamations of surprise and our deliberations what to do with it, the creature manifested no sign of uneasiness but a kind of hissing, nearly like the noise made by the geese when any one approaches their young. It continued to work as it had commenced, with its fin-like hinder feet, digging in the sand a cylindrical hole from eight to twelve inches broad ; it threw the earth very regularly and dexterously, and, as it were, keeping time on both sides, and began immediately after to deposit its eggs.

" One of our two soldiers laid himself all along on the ground near this purveyor of our kitchen, and took the eggs out of the hole as fast as the turtle deposited them ; and in this manner we collected a hundred eggs in about ten minutes. We considered whether we should add this fine animal to our collections ; but the great weight of the turtle, which would have required a mule for itself alone, and the difficulty of loading such an awkward burden, made us resolve to spare its life, and to content ourselves with its eggs.

" Those huge animals, the mydas and the soft-shelled turtle (*Testudo Mydas* and *coriacea*), as well as the *Testudo caretta* or *cauanna*, deposit their eggs in the sand in the warmest months of the year, particularly in this uninhabited part of the coast, between the Riacho and the Mucuri ; they come on shore for this purpose in the evening twilight, drag their heavy bodies up the sandy coast, dig a hole, in which they deposit their eggs, fill it up with sand, which they tread down, and an hour or two after sunset return to the sea. This was the case with the turtle which had so amply supplied us ; when we came back to the strand a few hours afterwards, it was gone ; it had filled up the hole, and the broad track left by it in the sand, showed that it had returned to its proper element. A single turtle of this kind can furnish an abundant repast with its eggs for a whole company ; for the mydas is said to lay at once ten or twelve dozen, and the soft-shelled from

eighteen to twenty dozen. These eggs are a very nutritious food, and are therefore eagerly sought after on this desert coast by the Indians, and in the neighbourhood of the colony also by the Whites."

FRIENDSHIP OF THE CROCODILE AND LITTLE RING-PLOVER,
(*Charadrius Aegyptius*, Hasselquist.)

[Translated from 'Description de l'Egypt,' *Hist. Nat.* vol. i. p. 198.]

“ ‘ As the Crocodile feeds principally in the water, the inside of his mouth is constantly infested with insects which suck his blood’ ” (with leeches, *sanguisuga*, as it has been rendered by preceding translators). “ ‘ Every species of land animals and of birds avoids him ; the *trochilus* alone lives at peace with him, because this little bird renders him a great service. Whenever the crocodile comes up out of the water to go upon land, and when he stretches out his half-opened mouth, (as he is in the habit of doing, having turned towards the west wind,) the *trochilus* creeps in, and devours all the insects which it finds there. The crocodile, sensible of this advantage, does him no injury.’ —Herodotus, Book 2. § 68.

“ This passage is one of those which has particularly exercised the acuteness of commentators. Some of them have regarded it as a mere fiction ; while others, in order to oppose themselves with greater effect against so odious an imputation, have pushed their zeal so far as to imagine and to create a new animal which could overreach the crocodile, and prove itself capable of performing the different actions attributed to the *trochilus*. But we shall shortly see that our historian has been as unskilfully defended, as he has been unjustly attacked.

“ Everything that depends upon the renewal of beings whom we see appearing again and again, with the same conformations and the same habits, is connected with the eternal youthfulness of Nature. Now that which is contained in the above passage, this compact agreed to between an enormous and cruel-tempered animal and a little defenceless bird, this mingling of such different interests, these scenes of reciprocal attachment,—all this is constantly and uniformly reproduced from age to age : and indeed if these phænomena were actually noticed two or three thousand years ago by the priests of Thebes and Memphis, I ought again to witness them. I, have again met with them unchanged in any one particular. I also have had this interesting spectacle before my own eyes ; truly valuable details, which no one would know how to invent and condense with an equal degree of conformity and perfect simplicity.

“Arrived in my turn on the shores of Egypt, and having observed there, after the lapse of so many centuries, every action under the different appearances in which life is displayed in this country, I have found the passage, which is the object of the present remarks, true in its general meaning, but inaccurate in some particulars. We shall see from the character of these inaccuracies, which I cannot refrain from remarking upon, that they lead us to the idea, that in this instance Herodotus has not observed for himself, but that he has drawn up his account from hearsay.

“Herodotus uses the word *bdella*—an animal that sucks—to describe these tormentors of the crocodile. This has become the Greek name for a leech, and is so translated generally, and Herodotus seems to have intended it to have that meaning. The true leech, (*Hirudo*, L.,) is not found in the running waters of the Nile, but is met with in standing waters, generally, in Egypt. These animals were probably gnats or muskitoes, which he mentions under the name *conops*, and which are now the insects that infest the crocodile.” (Having decided that the *trochilus* is the same species as that named by Hasselquist *Charadrius Ægyptius*,—which is very much like the *petit pluvier à collier* of France, if indeed it be not the same bird,—the author proceeds:) “I have paid great attention to the habits of the little plover: and having seen it pursue its prey, about which it is very dainty, even into the mouth of the crocodile, I am convinced about the facts, the knowledge of the true determination of which I so anxiously wished for. But the fact, that which I first noticed, is, that it is not for the purpose of cleansing his teeth, (for which the hind feet of the crocodile can and do suffice,) that the *trochilus*, or little plover, interests and busies itself about him. Now, what I have learnt both from my own experience and from the accounts of the fishermen, is, that every crocodile, when it comes up to repose itself upon the sand, is immediately attacked by a swarm of gnats, which fly about in immense numbers in the neighbourhood and over the surface of the water. His mouth is not so hermetically closed, as to prevent these insects from effecting an entrance into it; they introduce themselves, and arrange themselves there in such numbers, that the interior surface of the whole palate, which is of a bright yellow throughout, is covered with a coating of blackish brown, which is owing to the gnats arranged side by side. All these sucking insects thrust their trunks into the orifices of the glands, which are very numerous in the mouth of the crocodile.

“The following circumstance is well worthy of remark. There is at St. Domingo a crocodile which so much resembles that of Egypt, that I have had great difficulty in detecting the

distinctive characters of it. It is, however, particularly distinguished by its longer jaws, whence its Latin name of *Crocodilus acutus*; it also has the tongue longer, and therefore more completely enveloped in the interior and exterior integuments which are distributed between the maxillary branches. Here there is another crocodile, which, deprived of the use of its tongue, is unable to perform those actions which are necessary to preserve its palate in good preservation,—the same causes, and the same effects. Insects which are equally hurtful, if indeed they are not perfectly identical, called *maringouins* at St. Domingo, exist there as in Egypt. The crocodile of St. Domingo, in like manner coming to repose upon the sloping banks of rivers, is then equally exposed to the same torments as the crocodile of the Nile, and consequently requires the same assistance. But are these latter also administered by the little plover? This bird lives on the main land. However these may be, birds of similar habits, feeding upon the spawn of fish, on larvæ and small insects, are seen in every country, continually engaged in the search after this minute kind of nourishment, hopping about and running from place to place, and never neglecting to feast themselves whenever they have the opportunity. This opportunity is afforded by the mosquitoes, which never fail to attack the crocodile; they penetrate into his mouth, and cover the whole of its surface. The bird which performs this good office for the crocodile of St. Domingo, is, they say, the todier, a smaller species than the *Charadrius Ægyptius*, with a weak, depressed, and much flattened bill. It can then without difficulty enter the crocodile's mouth, and having finished its repast, come forth again in the same way. Except that it is another species that performs the part of the little plover, these are the same scenes as occur in Egypt,—a repetition of the same habits. This coincidence of manners was noticed by M. Descourtils, who staid for some time at St. Domingo, and who, hearing of my researches on this subject, did not fail to give the same direction to his own, of which science has happily just reaped the fruits.

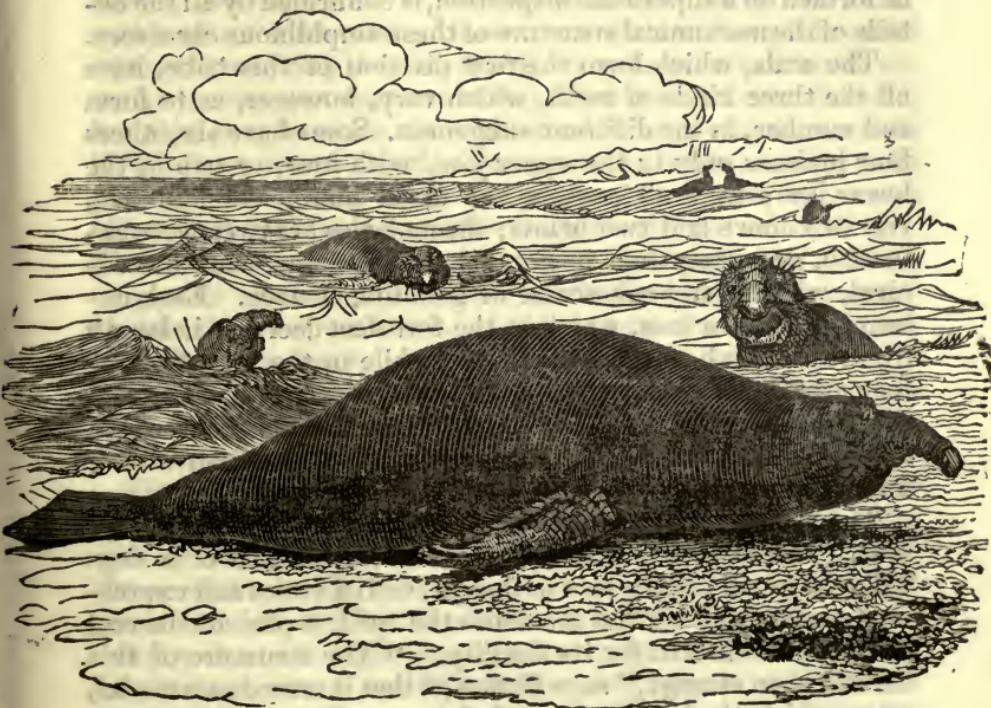
“ Neither of these crocodiles, which are equally deprived of the use of their tongue as an organ of motion, can supply its place by a recourse to their fore legs; these are too stiff, and very much too short to reach to the mouth. Nature, then, has formed the crocodile without the means of providing personally for its own well-being, for the care of its own preservation. In this case, being miserably abandoned to the bites of these insects, which, though very minute in size, are, by a singular concurrence of circumstances, rendered very formidable, it must follow that the crocodile would sink under the accumu-

lation of evils, unless it were able to remove them by appealing to the charity of some other animal.

“ The narrative of the ancients agrees in showing, that notwithstanding the opposite characters of their powers and dispositions, there do exist reciprocal duties and mutual attachment between the leviathan and the little bird. But what answer is to be given to the question,—which of the two, the crocodile or the trochilus, is most interested in the commencement and continuation of this alliance? It seems to me, that, before we knew of what happened at St. Domingo, we could only have recourse to judgement, necessarily accompanied by the ordinary chances of error, to come to a decision on this subject:—but now the question has acquired a foundation in precise and determinate facts. The most interested of the two is evidently the crocodile. It is certain, that if, in the imperfect state of its organs, the crocodile had been, at the great day of creation, confined to its own resources,—that is to say, if it had been left without any other assistance,—these species could not have lasted through so many ages and come down to our own times. We are then here in a state to give full belief to another account, more decisive and particular, of the motives which influence the crocodile:—it is the passage in which Pliny declares that the trochilus and the crocodile mutually invite one another to render this reciprocal service; ‘ the crocodile opens his mouth as wide as he can, which is pleasantly affected by the pecking of the bird.’

“ Thus, in the absence of a complete organization, Nature has come to the assistance of the crocodile, by inspiring it at least with a cunning and forbearance, which has preserved it from being destroyed as soon as created. Now what assistance could be more useful to him than that of a small and very active bird, eager in the pursuit of its prey, and quick in seizing it? Its Arabic name of *sag-sag*, *sexag*, or rather *tek-tak*, which signifies *that strikes*, expresses the common habit of these little plovers, which are continually striking the sand with the end of their bill, to discover and extract all the minute bodies on which they subsist. Conscious of the pleasure of being relieved, the crocodile shows himself grateful for the service rendered to him, and gently warns his companion to remove himself, when both ought to think of retreating. When we contemplate the perfect security of the little bird in the interior of an immense mouth, which, for every other animal is so cruelly murderous,—when we reflect on the renunciation, on the part of the stronger, of his natural ferocity, and the daring intrepidity of the weaker, and the mutual concession arising from reciprocal advantages,—we have one of the most extraordinary pictures of the habits of the animal cre-

ation laid before us,—a picture, which the ancients have presented to us without reserve or ambiguity; which has been simply and literally described by Herodotus, by Aristotle, and after them confirmed by Pliny, *Aelian*, and some writers of the first ages of the Christian æra. At this time greater faith was placed in the simple recital of habits of animals than is done at present. I add, as a last proof in favour of the preceding conclusions, that if there were any of the true leeches, (*Hirudo*,) in the Nile,—and we have stated above that they do not exist in the running waters of the rivers,—in that case the bill of the little plover would be too weak to divide them, to tear them in pieces, and reduce them to a state in which they would be useful to it in the way of nourishment.”



THE PROBOSCIS-SEAL, OR SEA-ELEPHANT, (*Phoca proboscidea*,
Péron.)

WHEN a seal is contemplated for the first time, its fish-like form and singularly shaped extremities lead to the supposition that it must belong to a peculiar and distinct order of animals most nearly allied to the cetaceous mammalia. But when its teeth and claws are attentively examined, these unerring guides distinctly point out its relation to the carnivorous order. Accordingly we find it placed in that division in the systems of

Ray and Linnaeus; and with Cuvier, the Linnæan genus *Phoca* is joined with the walrus to form his third and last tribe of *Carnivora*. In this tribe the feet are so curtailed and enveloped in integument, that on land they serve only to drag along the body with a clumsy, unequal motion; but as the intervals of the toes are filled up by membrane, they form excellent instruments for swimming. Accordingly it is found that these animals pass the greater part of their lives in the sea, and come on shore only to sleep and bask in the sunshine, and for the purposes of procreation and of suckling their young. Their elongated body; their very moveable spine, endowed with great strength of muscle to bend it in different directions; their narrow pelvis; their close-set smooth fur,—all contribute to make them excellent swimmers; and this idea, which would be formed on a superficial inspection, is confirmed by all the details of the anatomical structure of these amphibious carnivora.

The seals, which form the first division of this tribe, have all the three kinds of teeth, which vary, however, as to form and number, in the different subgenera. Some have six, others four incisors only in the upper jaw, with four, or two in the lower jaw; they all possess the usual number of laniaries, viz. two above and two below; the molaries are twenty, twenty-two, or twenty-four in number, always trenchant and conical, without any tubercular or grinding surface. Each extremity has five toes, which in the fore-feet decrease in length from the thumb to the little finger, while in the hind-feet the toes analogous to these two are the longest, and the intermediate ones the shortest. The hind-feet are directed backwards, and are united to a short, flattened tail, so as to form with it a rude resemblance to the tail of the manatee or whale.

The form of the head varies in different seals; it is always large, and in our common species resembles that of a dog. There is much intelligence in the eye, with a sweet and expressive aspect; and we find that from the earliest periods the seal has been celebrated for its docility. “The structure of this animal is so strange,” says Buffon, “that it served as a model, upon which the imagination of the poets framed the tritons, sirens, and sea-gods, with a human head, the body of a quadruped, and the tail of a fish. The seal, in fact, reigns in this mute empire by his voice, his figure, his intelligence, and his talents, which are common to him with the inhabitants of the land, and render him so superior to the fishes, that they seem not only to belong to another order of beings, but to a different world. This amphibious animal, though his nature be very remote from that of our domestic animals, is susceptible of a species of education. He is reared by keeping him often

in water ; he is taught to give a salute with his head and his voice ; he comes when called upon, and exhibits several other marks of intelligence and docility.

“ His brain is of considerable size ; his senses are as good as those of any quadruped ; and, consequently, his sensations are equally vivacious, and his intellect equally active. Both are exhibited in the gentleness of his manners, his social disposition, his affection for the female, his attention to his offspring, and in the expressive modulation of his voice, which is superior to that of any other quadruped.”

Fishes constitute the natural food of the seals ; they devour them in the water, and when they dive they are enabled to close the nostrils by means of a sort of valve. As they are able to remain long under water, Buffon supposed that this faculty resulted from a peculiar conformation of the heart, which allowed the venous blood to pass into the arterial system without traversing the lungs ; but Cuvier asserts that this structure, viz. the open aperture of *Botallius*, does not exist in them, but that they have, on the other hand, a large venous reservoir in the liver, where the blood accumulates when impeded in its passage through the lungs in consequence of the suspension of breathing which must take place during the act of diving. Their blood is very abundant, and dark-coloured. Their tongue is smooth, and forked at the end ; their stomach is simple, their cæcum short, and their intestinal canal long and of equable diameter.

The first natural division of the numerous family of the seals is into those that have no external ears, and those which possess these appendages.

The seals of the first division have pointed incisors ; and all their toes possess a certain degree of mobility, and are armed with pointed claws placed on the edge of the uniting web. Those which have six incisors above, and four below, form the genus denominated by Frederick Cuvier *Calocephalus*, from two Greek words signifying ‘well-formed head.’ Those with four incisors above and four below, and whose molaries are deeply cleft into three points, constitute the genus which the same naturalist has termed *Stenorhynchus*. A third group, with the same number of incisors as the preceding, but with the molaries ending in obtuse cones, is termed *Pelagiuss*. A fourth division, with only two incisors in the lower jaw, bears the name of *Stemmatopus* ; and, lastly, the earless seal, whose figure illustrates the present article, and whose elongated snout forms so striking a feature in his physiognomy, constitutes the fifth subgeneric division of the French naturalist, under the appropriate designation of *Macrorhinus*.

The seals with external ears apparent, are included under the collective term *Otaria*; they have also been divided into subgenera; which, however, we shall pass over, and return to the more particular history of the sea-elephant, as it is called by English sailors; the *Phoca proboscidea* of Péron and Le Sueur.

No apology can be necessary for proceeding at once to the translation of the interesting history of this singular animal given by the intelligent travellers and scientific naturalists above mentioned.

“ In rendering it compulsory on the seals to come on shore to bring forth their young, Nature seems to have voluntarily devoted them to death and destruction. In fact, devoid of any means of defence, and scarcely able to drag themselves along the ground, the seals everywhere fall victims to the larger animals, and above all, to man; so that, equally avoiding these two kinds of enemies, the timid herds only multiply in abundance on those remote islands, and those solitary rocks, where, in the midst of eternal ice, the savage beasts of prey exist not, and man has not yet fixed his habitual abode. The greater part of the islands in the Australian regions ought therefore, on both accounts, to form an especial retreat for these legions of amphibious quadrupeds; since in these places, there exists no beast of prey larger than a common cat, and the human species, which is so rare on the larger tracts of land, does not inhabit the innumerable neighbouring islands. These, then, form the dominions of the seal; successively occupied by their peaceful invasions, from the Malouin Islands and Tristan d’Acuña, to the land of De Witt, and the middle of the Australian regions. There is no part of this immense space that does not support species of a greater or less magnitude, herds more or less numerous, of the family of seals, so little known up to the present time, and which cannot fail one day to form one of the principal sections of the animal kingdom.

“ At the head of these oceanic mammalia of the antarctic hemisphere, must be placed the proboscis-seal, one of the hugest and most extraordinary of those which are known. In indicating it by the specific name of *leonina*, Linnæus gave it a character it never possessed, viz. that of a crest or mane on the head, *fronte cristatâ*; a mistake which evidently originated in the incorrect figures of Anson and Pernety; but every naturalist after Linnæus has committed the same error.

“ The savages of New Holland call the seal we are at present treating of, *Mourong*.

“ The English sailors employed in the fishery on these coasts call it the *Sea-elephant*; and the bay in the Isle of King,

where these mammalia congregate in greatest number, has received the name of ' Bay of Elephants.' This latter designation, which is evidently deduced from the gigantic proportions of the animal, the rudeness of its outlines, and above all, from the kind of trunk in which its snout terminates, would be rather appropriate, if it had not already been applied to the walrus, which itself borrowed the term from the singular tusks, analogous to those of the elephant, which project from the upper jaw.

" As none of these several denominations, therefore, can be appropriately applied to this species, we propose to call it the Proboscidean Seal, (*Phoca proboscidea*), which brings to mind the character which distinguishes it from all the other species hitherto known.

" It is characterized by its enormous proportions, being commonly twenty, five-and-twenty, or even thirty feet in length, and from fifteen to eighteen feet in circumference ; its colour is greyish, or blueish grey, rarely of a dark brown ; it has no external ears ; the two inferior laniaries are long, strong, curved and projecting ; the whiskers are formed of very stiff and long bristles twisted like a screw ; similar bristles project above either eye, and represent the eyebrows. The eyes are very large and prominent. The fore-feet or paddles large and vigorous, presenting at their extremity, near the posterior margin, five small black claws. The tail is very short, almost concealed between two flattened horizontal flippers, dilated at their extremity. But the most prominent character is the prolongation of the muzzle, or rather of the nostrils. When the animal is at rest these nostrils, being relaxed and pendant, give its face a broader aspect ; but whenever they are raised by a strong respiratory effort, or when the animals are engaged in attack or defence, they become elongated, forming a tube of about a foot in length ; and not only is the shape of the head rendered very different by this action, but the tone of the voice is considerably modified. The females are strangers to this organization ; they even have the upper lip slightly fissured at the margin. In both sexes the hair is extremely close-set, but is of too inferior a character to be put to the same use as the finer fur of other antarctic species of seal.

" Inhabiting exclusively the antarctic regions, the proboscis-seal delights more particularly in the desert isles, and seems to show an exclusive preference to some of them. Thus among the numerous islands of Bass's Straits, these seals only dwell in great numbers, on *Hunter's*, *King's* and *New Year's* Islands. One scarcely finds an individual on the *Two Sisters* ; they seem to be complete strangers to the Island *Maria* ; on

the island *Decrès* I only found a single tooth of the proboscis-seal. Lastly, this amphibious creature does not exist on the continent of New Holland, nor on the shores of Van Diemen's Land; and the species is only known to the inhabitants of these countries by an individual being occasionally carried thither by a storm or current.

“Numerous herds of these seals inhabit the land of Kerguelen, the Island of Georgia, and the land of the States, where the English habitually maintain their fishery of these animals. They exist in great numbers on the Island of Juan Fernandez. It is probable that the small fresh-water lakes in which these seals delight to bathe, may induce their preference for particular spots; but from all the observations that have hitherto been made, these powerful animals are confined between the 35th and 55th degrees of south latitude, inhabiting the Atlantic and the great Southern Ocean.

“Besides choosing some islands by preference, these seals also change their residence at particular seasons; they are in fact migratory animals. Equally obnoxious to extreme heat as to severe cold, they advance with the winter season from the south to the north, and return with summer in the contrary direction. It is in the middle of June that they perform their first migration, covering, in countless multitudes, the shores of King's Island, which sometimes, the English sailors say, are blackened by them. The same migratory movements have been remarked by Rogers and Steller in other species of seals, which they have compared, in that respect, to swans, wild geese, &c.

“A month after their arrival, the females bring forth; at this period they are surrounded by the males, which prevent their return to the sea, and even compel them to remain on shore, until the period of suckling their young is ended. Nay, it is asserted that when the mothers, wearied of this confinement, endeavour to drive away their offspring, the males bite the young ones and compel them to return. The female has but one young, which measures, when born, from four to five feet in length, and weighs about seventy pounds; the males are already larger than the females.

“The mother turns on her side to give suck to the young. Lactation lasts seven or eight weeks, during which period the females, guarded as above mentioned, neither eat nor come down to the sea. This strange abstinence did not escape the observation of the unfortunate Alexander Selkirk, who informed Captain Rogers, that towards the end of the month of June these animals visited his solitary abode, bringing forth their young about a musket-shot from the sea, and stay-

ing to the end of September, without shifting their place, or taking any kind of nourishment during all that time. Forster relates the same circumstance ; and adds, that towards the latter end of their fast, when they have become extremely emaciated, they swallow a considerable quantity of stones, to keep their stomachs distended. The growth of the young is extremely rapid ; at the end of eight days it weighs 100lbs. So considerable an increase can only take place at the expense of the parent, for she does not repair by any kind of food the loss of the nutritious substance which she has supplied. Hence she visibly grows lean ; some have even been observed to perish during this painful lactation ; but it is, of course, uncertain whether an internal malady might not have been the cause.

“ At the end of fifteen days the milk teeth appear, and are completed in four months. The stages of growth follow so rapidly, that in three years the young animals have acquired a length of from eighteen to five and twenty feet, which is the ordinary limit of their growth in this direction ; they afterwards increase only in breadth. At this period the young males first acquire the proboscis.

“ At the age of six or seven weeks the young ones are conducted to the water ; the shores are then abandoned for some time, the whole herd row together, if we may so express ourselves. The manner of swimming of these mammalia is rather slow ; they are forced, at very short intervals, to come to the surface of the water to breathe the air, which is essential to their existence. It is observed that when any of the young seals separate from the herd, they are immediately pursued by some of the old ones, who compel them, by biting, to return to the family group.

“ After having remained three weeks or a month at sea, both to familiarize the young ones with that element, and to repair the powers that have been exhausted by a long abstinence, the sea-elephants return a second time to the shore, and the work of reproduction recommences.

“ At this period the males have furious and bloody combats, but always individual against individual. Their manner of fighting is remarkable. The two colossal rivals drag themselves heavily along ; they meet, muzzle to muzzle ; they raise the whole of the fore-part of the body on their flippers ; they open wide their enormous mouth ; their eyes are inflamed with fury : thus prepared, they drive themselves furiously against each other, and falling together with the shock, teeth to teeth, and jaw to jaw, they reciprocally inflict severe lacerations ; sometimes the eyes are torn out of their sockets in this conflict ; still more frequently they loose their tusks ;

blood flows abundantly; but the obstinate combatants, without appearing to feel their wounds, continue the fight until their powers are completely exhausted. It is rare to see one left dead on the field of battle, for their wounds are observed to heal with inconceivable promptitude. The English sailors attribute this to some peculiar qualities of the blubber, the natural salve; but it probably results from the obvious influence this substance must have in excluding the air from the wounds, and in arresting the bleeding.

“ During these murderous conflicts, the females remain indifferent spectators to the rage they have excited, and submit to the conqueror, who assumes the mastership of the herd. The sailors call him the Bashaw, comparing him to the jealous and despotic master of a Turkish harem.

“ The sun now approaching the antarctic hemisphere, the heat increases, and the whole herd resumes the route to the southward, there to remain till the return of frost compels them again to resort to the more temperate coasts of the Isle of King. Some individuals, however, are observed to stay there throughout the summer; but whether detained by infirmity, or loss of strength necessary for an extensive navigation, or by some other disposition which renders a greater degree of heat essential to them, is uncertain.

“ The great migrations of the sea-elephant, however remarkable they may be, are not peculiar to this species; the habit probably obtains with every tribe of seals. Influenced by the same wants, these voyages take place in both hemispheres at analogous periods, and in this respect the conformity of habits is so great between the seals of the north observed by Steller, and those we have been describing, as to render it probable that these migrations are the same in all the amphibious mammalia.”

[To be continued in our next Number.]

PRELIMINARY OBSERVATIONS TO THE HISTORY OF THE MEDUSÆ
OR SEA BLUBBERS, BY MM. PÉRON AND LESUEUR.

[From the ‘Annales du Muséum d’Histoire Naturelle,’ vol. xiv. page 219.]

“ Of all the Zoophytes which Nature has scattered over the surface of the ocean, none are more numerous or more extraordinary than those to which the great Linnæus has given the name of Medusæ. Every sea supports different tribes of these singular creatures: they live in the midst of the almost frozen waters of Spitzbergen, of Greenland, and of Iceland; they multiply under the heat of the equator; and the great Southern

Ocean also nourishes rich and numerous species of them. Every maritime people, from the highest antiquity, seem to have been acquainted with them; Philippides, Eupolis, Aristophanes and Diphilus before Aristotle, have mentioned them; and from the time of Pliny down to our own age, more than one hundred and fifty writers of all the nations of Europe have occupied themselves with their history.

“ Notwithstanding so many labours and praiseworthy exertions, the genus Medusa is still one of those which most abounds with the uncertainties and errors of the naturalist; and these uncertainties, these errors, belong to the very nature of the animals about which we are speaking. In fact, no other animals unite such singularity in the nature of their constituent substance, so much variety in their forms, so much diversity in their organs, so many anomalies in their *vital functions*,—and none therefore present the physiologist with more problems to resolve, or more discoveries to follow up.

“ The substance of the Medusæ, for instance, resolves itself, by a kind of instantaneous fusion, into a fluid analogous to sea-water, and yet the most important functions of life are carried on in a body which seems to be, as it were, nothing but coagulated water. The multiplication of these animals is prodigious; but we know nothing positively about their mode of generation; they may attain the size of several feet in diameter, they sometimes weigh from fifty to sixty pounds, and yet their digestive organs escape our notice; they execute very rapid and long-continued motions, but the details of their muscular system are unknown; their secretions are very abundant, and we see nothing which can furnish us with a theory about them; they have some sort of respiration which is very active, while the true seat of it is a mystery; they appear excessively weak, but fish of considerable size are their daily food; one would imagine that their stomach was incapable of any kind of action on these latter animals, but in a few moments they are digested: many of them conceal in their interior considerable quantities of air; we are equally ignorant by what means they can either receive it from the atmosphere, or from the water, or develop it in their intestines. A great number of these Zoophytes are phosphoric; they shine in the midst of darkness like so many globes of fire; but the nature, the principle, and the agents of this wonderful property are as yet undiscovered: some of them sting and benumb the hand that touches them; the cause of this sensation is still a problem. It would be easy for me to enter into longer details of the singularities which distinguish the Medusæ; but it is sufficient to have pointed out the

principal claims which they have always had to the interest of observers, and to have laid before the reader all the importance of the researches towards which I am going to call his attention.

" In the midst of the vast seas which our vessels have traversed, we, M. Lesueur and myself, have discovered more new species of animals of this kind, than the naturalists of any age or country had made known before us. These numerous species have been described and painted from living individuals; they have afforded us grounds for a multitude of researches and important discoveries. On the other hand, all the authors who have written on Medusæ have been laid under contribution: I have myself undertaken the task of extracting from many hundred volumes in different languages, all that could have any relation to these animals, and M. Lesueur himself has copied the designs and paintings scattered through the numerous volumes with which he has been engaged; and lastly, our recent excursions on the coast of La Mancha, and the shores of the Mediterranean, have placed at our disposal the greater part of the European species which have been described before us.

" Having so large a fund of materials, we propose to ourselves in this work, to give successively the history of all the species and of all the genera which ought naturally to compose this great family of the animal kingdom: we shall treat in detail of the organization and the habits of these singular beings; we shall set forth all that we have been able to discover about their various systems of locomotion, of digestion, of generation, &c.; we shall relate the series of experiments by which we have been led to discover in the Medusæ a mode of respiration analogous to that of the more perfect animals, and which, however, has hitherto escaped the researches of the most skilful observers; we shall mention the different phænomena of the phosphorescent property, and we shall dwell with so much the more interest on this subject, since it connects itself more immediately with the great problem of the phosphorescence of the sea.

" However simple may be the organization of the Medusæ, still they are not scattered indiscriminately over the surface of the ocean; each species has its proper sphere of existence, beyond the limits of which it does not seem to extend. It may be that the temperature of the waves, the nature or the abundance of its food retains it there, or that the limited power of locomotion which characterizes these animals, does not permit them to go far from the places where they have been originally established by nature. Whichever of these

be the true cause, it is not less certain, that to such and such latitudes belong exclusively such and such species of Medusæ: it is in such situations that the astonished observer meets with those immense shoals of similar individuals, in the midst of which he sometimes sails for several days, but of which the ocean afterwards furnishes him with no traces. This curious circumstance in the existence of the animals of which we are speaking, having been the object of our especial attention, we shall not fail to join to the history of each genus, a geographical table of the distribution of all the species of which it is composed.

" There are, in the same way, different seasons when the Medusæ show themselves in different countries; and this observation becomes particularly valuable as regards the history of those which live in our own seas. These Zoophytes do not in fact appear on the coasts of Italy, of Spain, of France, of England, of Sweden, of Denmark, of Iceland, of Greenland, and of Spitzbergen, until the middle of spring; they are most particularly abundant there during the dog-days: their number diminishes on the approach of autumn, and about the middle of November their countless legions disappear, and go, perhaps, like many other marine animals, to bury themselves and become insensible in the depths of the sea. In the seas under the equator, on the contrary, the Medusæ cover the waters, even in the midst of the winter of those countries; and everything shows that these latter species are strangers to the migrations, or rather hibernation, of the Medusæ of our climates. Considered under this point of view, our work will, we think, offer some new and interesting results. Domestic economy has not entirely neglected the Medusæ; Diphilus, Siphnius, Dioscorides, and the other physicians of ancient Greece, mention them as a valuable remedy for the gout, chilblain, &c.

" Philippides in his *Amphiarus*, Athenæus in the third book of the *Deipnosophistes*, mention the species 'velella' as excellent eating; and again in our own times, the same animals are greedily sought after by the epicures of Sicily, by those of the Ionian Sea, and especially by the Greeks of the Morea. In some places the Medusæ are employed to manure the land.

" None of these facts will be foreign to the history in which we are engaged: to collect them and set them forth with care, will undoubtedly draw a fresh degree of interest towards animals which have been too much neglected, under the double relation of science and of public utility. So many singularities mark the animals of which we are writing, that it is not surprising that amongst different nations they should

have given rise to a multitude of traditions and ridiculous fables, as if all the extraordinary productions of nature must necessarily be a constant source of superstition and terror to the human mind. We have thought that we ought not to neglect these popular traditions; without being indispensable to science they form an interesting supplement to it.

"We shall conclude our history with an alphabetical table of all the names, generic, specific and trivial, which have been employed by different authors and different people to designate the *Medusæ*, and some curious results have been obtained from this comparison: thus for instance, from the most ancient periods of history to our own times, we find all nations agreeing to designate these animals by names corresponding to the *cnide* and *acalephe* of the Greeks, which also correspond to the *urtica* of the Latins; and, if we endeavour to ascend to the origin of this singular conformity of names, we shall find it in the property which some species have of causing a stinging and burning sensation, similar to that which, under the same circumstances, the nettle, *Urtica urens*, of the different countries of Europe, will produce."

The following is the outline of the principles of the classification, proposed by MM. Péron and Lesueur, for these animals:—

- 1st. The *Medusæ* which are entirely gelatinous.
- 2d. Those which have a vesicular membrane, containing air, attached to the upper part of the body.

Of the first division, some of the *Medusæ* have the margin of their disk ciliated; others have the margin simple. Some have no stomach, the *Agastria*; others possess that cavity; and, of these some have a single aperture leading to it, the *Monostoma*, while others have many apertures, the *Poly-stoma*. Again, some *Medusæ* have a central peduncle, dependent from them, while others are destitute of this appendage.—Such are the points of structure which these Naturalists have adopted as foundations of their primary divisions of this singular and beautiful group of animals.

CHARACTERS OF THE PANTHER AND LEOPARD.

To the Editor of the Zoological Magazine.

SIR,

In reply to your invitation to state my opinion of the specific characters of the Panther and Leopard, founded by M. Temminck on the number of the caudal vertebræ, I will candidly admit that I omitted to take advantage of many opportunities to ascertain the fact. In the absence of personal

knowledge, let us see what benefit we can derive from the observation of those whose names should be a guarantee from error.

	Panth.	Leop.
M. Cuvier, <i>Anat. Comp.</i> , states the number of the caudal vertebræ	24	—
M. Temminck, <i>Monogr. of Felis</i>	28	22
M. Lesson, <i>Man. de Mammalogie</i>	18	22

As far as regards the panther, therefore, the results are nugatory; and we have the choice of supposing, either that the number of caudal vertebræ differ in different individuals, or that different species of *felis* have been examined for the panther, or that there are typographical errors in the published accounts. I possess two skeletons of the panther, but the bones of both were mixed by accident; and as the caudal vertebræ do not correspond with any of the above numbers, it is probable they suffered from the depredations of birds while exposed to dry.

I may add to my characteristics of the panther and leopard, that I think the head of the latter slightly more elongated, the line of the face and cranium less arched, and the frontal bones somewhat flatter, than in the former.

M. Cuvier says, (*Oss. Foss.*, tom. iv. p. 427,) “ *Le Felis varia* de Schreber, pl. 101. B. ne me paroit différer du *leopardus* que par une enluménure trop rouge.”

This figure differs so slightly from Schreber's, pl. 101, which is Buffon's *Felis leopardus*, that I cannot but consider them the same. If such be the case, Buffon, Schreber and Cuvier entertain in common specific ideas with respect to the leopard; and as the figure of the animal so designated bears a sufficiently close resemblance to the figure of the leopard by Major Hamilton Smith, (‘Animal Kingdom,’) to a stuffed specimen in the India House, and to a living specimen in the Zoological Gardens,—and as M. Temminck, M. Lesson, and the translators of the *Règne Animal*, agree in certain characters of the skin applicable to these figures and specimens, I think we may admit the type of the leopard to be a large cat, of a comparatively paleish tawny, with the rose rings much broken into dots, but still preserving, more or less, the ring form; and the panther is characterized by crowded rose rings little broken; the ground-colour of a deeper hue, and less of it visible. We may set aside length of tail, and trifling variations in size. By the by, if M. Temminck's assertion respecting the length of the panther's tail hold good, there is not an animal in the Zoological Gardens apparently entitled to that name. We readily recognise the lion, royal tiger, and puma by their colours; the jaguar especially by its

rings, with a spot in the middle; the hunting leopard by its full round spots not arranged in rings, (independently of the peculiar form of the creature); the ocelots by their longitudinal elongated ovals, linear markings, and small size; and with the above characters of the panther and leopard, attending also to form, I think it would not be very difficult to distinguish them. Occasional varieties of every species of *Felis* will no doubt be met with, but it must be kept in mind, that these are exceptions to the rule.

Your obedient Servant,

W. H. S.

INGENUITY OF A THRUSH.

[From a Correspondent.]

DURING a visit to a lady in the country, I was walking in the garden one day, and observed in several spots a large quantity of broken snail shells in a circle, round some large stones, which seemed to have served the purpose of an altar of sacrifice. Mrs. B. told me that she had frequently observed a thrush hopping up with a snail in its beak to one of these stones, against which it knocked the snail, broke the shell, and then swallowed the slug.

OBSERVATIONS ON THE LORIS, OR SLOW-PACED LEMUR.

[From Sir William Jones's Works, vol. i. p. 544.]

" IN his manners he was for the most part gentle, except in the cold season, when his temper seemed wholly changed; and his Creator who made him so sensible of cold, to which he must often have been exposed even in his native forests, gave him, probably for that reason, his thick fur, which we rarely see on animals in these tropical climates: to me, who not only constantly fed him, but bathed him twice a week in water accommodated to the seasons, and whom he clearly distinguished from others, he was at all times grateful; but when I disturbed him in winter, he was usually indignant, and seemed to reproach me with the uneasiness which he felt, though no possible precautions had been omitted to keep him in a proper degree of warmth. At all times he was pleased with being stroked on the head and throat, and frequently suffered me to touch his extremely sharp teeth; but at all times his temper was quick, and when he was unseasonably disturbed, he expressed a little resentment by an obscure mur-

mur, like that of a squirrel, or a greater degree of displeasure by a peevish cry, especially in winter, when he was often as fierce, on being much importuned, as any beast of the woods. From half an hour after sunrise to half an hour before sunset, he slept without intermission rolled up like a hedgehog; and as soon as he awoke, he began to prepare himself for the labours of *his* approaching day, licking and dressing himself like a cat; an operation, which the flexibility of his neck and limbs enabled him to perform very completely: he was then ready for a slight breakfast, after which he commonly took a short nap; but, when the sun was quite set, he recovered all his vivacity. His ordinary food was the sweet fruit of this country; plantains always, and mangoes during the season; but he refused peaches, and was not fond of mulberries, or even of guaiavas; milk he lapped eagerly, but was contented with plain water. In general he was not voracious, but never appeared satiated with grasshoppers; and passed the whole night, while the hot season lasted, in prowling for them: when a grasshopper, or any insect, alighted within his reach, his eyes, which he fixed on his prey, glowed with uncommon fire; and, having drawn himself back to spring on it with greater force, he seized the victim with both his fore-paws, but held it in one of them while he devoured it. For other purposes, and sometimes even for that of holding his food, he used all his paws indifferently as hands, and frequently grasped with one of them the higher part of his ample cage, while his three others were severally engaged at the bottom of it; but the posture, of which he seemed fondest, was to cling with all four of them to the upper wires, his body being inverted; and in the evening he usually stood erect for many minutes, playing on the wires with his fingers, and rapidly moving his body from side to side, as if he had found the utility of exercise in his unnatural state of confinement. A little before day-break, when my early hours gave me frequent opportunities of observing him, he seemed to solicit my attention; and, if I presented my finger to him, he licked or nibbled it with great gentleness, but eagerly took fruit when I offered it; though he seldom ate much at his morning repast: when the *day brought back his night*, his eyes lost their lustre and strength, and he composed himself for a slumber of ten or eleven hours.

“ My little friend was, on the whole, very engaging; and, when he was found lifeless, in the same posture in which he would naturally have slept, I consoled myself with believing, that he had died without pain, and lived with as much pleasure as he could have enjoyed in a state of captivity.”

ZOOLOGICAL CALENDAR FOR MAY.

THE greater number of our English quadrupeds have already brought forth their young, and are engaged in providing for their respective families. The hind produces her offspring about the end of the month.

In this month, the latest of our summer birds of passage arrive. The fly-catcher (*Muscicapa Grisola*), is mentioned in White's Calendar as appearing about the middle of the month, and is called by him "the latest bird of passage." Several other species are also first seen about the same time; amongst which are the swift (*Hirundo Apus*), the goat-sucker (*Caprimulgus Europaeus*), the red-backed shrike (*Lanius Collurio*), the land rail (*Rallus Crex*), the wood wren (*Sylvia Sibilatrix*), the fauvette (*Sylvia hortensis*), the field lark (*Alauda trivialis*), &c. The following species are engaged in incubation, or in preparing their nests,—the sky lark (*Alauda arvensis*), the greater redpole (*Fringilla cannabina*), yellow wren (*Sylvia Trochilus*), goldfinch (*Fringilla Carduelis*), bullfinch (*Loxia Pyrrhula*), bearded tit (*Parus biarmicus*), golden plover (*Charadrius pluvialis*), and the ring dottrel or ring plover (*Charadrius hiaticula*), which, if not the same species, is very nearly allied to the one which renders such grateful service to the crocodile.

Numerous tribes of insects which have been unseen by us during the winter months, again show themselves as the warmth of the sun increases. Several species of moths and butterflies may be seen,—the dragon fly (*Libellula*), the lady cow (*Coccinella bipunctata*), the May bug (*Scarabaeus Melolontha*), the forest fly (*Hippobosca equina*), the female wasp (*Vespa vulgaris*), &c. appear; field crickets (*Gryllus campestris*) are heard; and the light of the glow-worm (*Lampyrum noctiluca*) may be noticed in the evening on banks near woods and hedgeways.

The greater number of our fresh-water fish, and of our reptiles, have already deposited their spawn; the perch (*Perca fluviatilis*), the bream (*Cyprinus Brama*), the minnow (*Leuciscus phoxinus*), and the chub (*Leuciscus cephalus*) deposit their spawn during this month.





PRÆHENSILIS PORTATINE.

ZOOLOGICAL MAGAZINE.

THE PREHENSILE PORCUPINE, or COENDOU,
(*Synetheres prehensilis*, Fr. Cuvier.)

THE relations which animals were first observed to bear to one another reposed on general appearances only, on the resemblance of their outward forms, on the nature of their integuments, and, in a word, on the most superficial and obvious organs. Thus the porcupine and the hedgehog, being both covered with a conspicuous defensive armour of spines, were classed together, as being animals whose organization was analogous. They were regarded in this manner by the ancients; and in the posthumous volumes of Aldrovandus, published in the 17th century, we find them thus associated together. The erroneous nature of these approximations was so palpable, that it was detected the instant an attempt was made to classify animals by their natural affinities; and the porcupine was transferred to the Rodentia, while the hedgehog was left next the shrews. But the porcupine was not the only Rodent which had long spines instead of hairs: other species were found in America, in the East Indies, and in Africa; and we find Ray, Linnæus, and the majority of their successors, grouping all these animals in the same genus, under the common appellation of Porcupine (*Hystrix*). In this approximation they were doubtless influenced, though with some restrictions, by the same preconception which had guided their predecessors, by that early notion that animals covered with integuments of so remarkable a kind should form a natural group. However, as one of these porcupines had a prehensile tail, M. de Lacépède separated it from the rest, to form the type of a distinct though allied genus.

These Rodentia, armed at all points by strong and acute spines,—the porcupines mentioned in Travels and Works of natural history,—are already ascertained to be tolerably numerous; but they are far from being all so well known as to enable us to determine their real nature, and mark out their affinities. Those of Italy and Spain are said to have been originally derived from Africa. Porcupines are common in Barbary, Abyssinia, Guinea, and at the Cape of Good Hope: they are met with in Asia Minor, Palestine, and Persia: they exist in all the southern parts of Asia, and the neighbouring islands; and lastly, South and North America equally produce them.

From what we know already of the laws which regulate the geographical distribution of animals, it might be presumed that these spine-coated Rodentia would include different genera, requiring only the means of instituting the necessary comparisons in order to bring their distinctive characters to light. This has been effected in a great measure by the labours of M. Fred. Cuvier, who has separated from the genus *Hystrix* of Linnæus, the Java porcupine, under the title of *Acanthion*; the Canada porcupine, or *Urson* of Buffon, under that of *Erethizon*; the Brazilian porcupine, under that of *Sphiggurus*: and for the Mexican species, described and figured in the present Number, he proposes the generic name of *Synetheres*, as preferable to that of *Coendus*, originally given to it by the Count Lacépède.

The Coendou is an animal altogether peculiar and distinct: no other species resembles it in its general forms. Its gait is as heavy and ungraceful as its proportions, notwithstanding it is endowed with an additional locomotive organ to those usually granted to the Rodentia, viz. a prehensile tail. But it is in the shape of the head and muzzle that it is more especially remarkable. All that part which corresponds to the brain is raised and expanded so as to announce a most highly developed cerebral organ within; but this is in reality no larger than in other Rodents. The phrenological character is here produced by large sinuses, which extend in every direction over the frontal bones, covering the brain anteriorly, and augmenting the extent of the organ of smell; for these cavities communicate with the nostrils. The muzzle presents a thick obtuse fleshy projection, in front of which are the orifices of the nostrils, of a very simple form. In all these respects there is no resemblance between this animal and the porcupine; and the same characters serve even better than the prehensile tail to separate it from every other Rodent, being indicative of a fundamentally different nature, peculiar habits, and consequently the type of a distinct genus. But if by its physiognomy it is found isolated from all the other known species of its class, it nevertheless appertains in its dentition, like the other spiny genera, to the omnivorous Rodentia with compound teeth.

The Coendou has four molars on either side, both in the upper and the lower jaw, which diminish in size from before backwards: their structure is analogous to that of the *Urson* shown at fig. 9. of the Plate of dentary characters in the present Number.

The external conformation does not indicate a lively or predominant sensibility in any of the organs of sense. The eyes are small and prominent, and their pupil, which can only be

distinguished by a weak light, is round: it is closed altogether in full daylight. The nostrils open by two simple circular apertures, which are situated close together on a broad flattened surface, covered with a smooth but not glandular integument. It is by the sense of smell chiefly that this animal takes cognizance of external objects. The ear is of an extremely simple structure, being composed merely of a circular ridge crossed transversely by two slight elevations. The mouth is of a remarkably diminutive size, scarcely opening sufficiently to allow a passage for the incisors, or permitting any great degree of separation of the jaws. The tongue is smooth: there are no cheek pouches.

The exterior coat consists almost entirely of spines, adhering to the skin by a narrow pedicle, and consequently detaching themselves readily from it. Hairs are found only on the under parts of the body and upon a portion of the tail. Strong whiskers project from the sides of the muzzle. The organs of motion have a special structure, from which results the natural destination of the Coendou to be an animal of the woods, to live on trees, to dwell on their summits, to derive from them its nourishment, and there to propagate and rear its family. Its fore-feet are strong, with four distinct and regular digits, armed with long and strong, but thin and pointed, claws. The thumb is indicated merely by a large moveable tubercle, covered with a very papillose skin, and capable of being opposed to a certain degree to the other digits. The hind-feet have also four toes; the sole is similarly papillose, and the thumb seems still more developed in them than in the fore-feet; so that the animal can truly grasp objects between this thumb and the other digits, which gives it the faculty of perching, almost like birds, on the smallest branches.

To feet formed in this favourable manner is added, as we have before observed, a prehensile tail; but it presents the peculiarity, and is the only example hitherto known, of having the prehensile surface above, and consequently curving in a direction contrary to that of other tails which are organized for twisting round and clinging to branches, &c.

The spines are mostly of a yellowish white colour at the root, black in the middle, and white at their extremity. The thickest are on the anterior parts of the body, and the longest on the back, where they measure about three inches in length. On the extremities, the sides of the head, and along the first half of the tail, they are thinner and shorter; and on the remainder of the tail, and on the under parts of the body, they are gradually reduced to the dimensions of simple hairs. The muzzle and soles of the feet are naked, and are of a reddish brown colour.

The principal dimensions of the Coendou are as follows :—

Length of the body, two feet.

Length of the head, four inches.

Length of the tail, fifteen inches.

Height at the middle of the body, one foot.

All the movements of the Coendou are slow, and bespeak circumspection and timidity. It only takes exercise in the evening, or during the night ; and although it is then tolerably active, it has never been seen to make a bound. When it would pass from one place to another, it advances by degrees, fixing each of its feet ; and before raising any of them it assures itself of the stable footing of the others ; and its tail, wound round the objects within its reach, is ready to grasp them if the other points of support should fail. This animal can raise itself upon its hind-feet, and in that position carries its food to its mouth with the fore-feet.

The above account of this singular species is derived chiefly from the *Mémoires du Muséum*, and the splendid work entitled *Histoire des Mammifères* of MM. St. Hilaire and Cuvier, from which our figure is copied. The original was a female specimen, which was living for some time in the Garden of Plants at Paris. We would suggest to our subscribers who may have friends in Mexico, to direct their attention to this remarkable animal. Its native name, as given by Hernandez, is 'Hoitzlacuatzin,' or the Prickly Opossum.

OBSERVATIONS ON THE FLYING-FISH.

"July 6.—THE flying-fish today were more numerous and lively. They rose in whole flights to the right and left of the bow, flying off in different directions, as if the vast body of the ship alarmed and disturbed them. Others however, at a greater distance, kept rising and falling without any visible cause, and apparently in the gladness of their hearts, and in order to enjoy the sunshine and the temporary change of element. Certainly there was no appearance or probability of any larger fish being in pursuit of even one hundredth part of those which we saw, nor were there any birds to endanger their flight ; and those writers who describe the life of these animals as a constant succession of alarms, and rendered miserable by fear, have never, I conceive, seen them in their mirth, or considered those natural feelings of health and hilarity which seem to lead all creatures to exert, in mere lightness of heart, whatever bodily powers the Creator has given them. It would be just as reasonable to say that a lamb leaps in a meadow for fear of being bitten by serpents, or that a horse gallops round his pasture only because a wolf is at his heels,

as to infer, from the flight of these animals, that they are always pursued by the bonito.”—Bishop Heber’s *Journal of a Voyage to India*.

THE CEYLON LEECH.

DR. DAVY, in his account of Ceylon, gives a full description of this troublesome and occasionally dangerous little animal. He describes it as varying in its dimensions; the smallest being exceedingly minute, and the largest seldom more than half an inch long.

He says, “This leech is a very active animal: it moves with considerable rapidity, and it is said occasionally to spring. Its powers of contraction and extension are very great: when fully extended it is like a fine cord; and its point is so sharp, that it readily makes its way through very small openings. It is supposed to have an acute sense of smelling; for no sooner does a person stop where leeches abound, than they appear to crowd eagerly to the spot from all quarters.

“Those who have had no experience of these animals, of their immense numbers in their favourite haunts, of their activity, keen appetite, and love of blood, can have no idea of the kind and extent of annoyance they are to travellers in the interior, of which they may be truly said to be the plague. In rainy weather it is almost shocking to see the legs of men on a long march, thickly beset with them, gorged with blood, and the blood trickling down in streams. It might be supposed that there would be little difficulty in keeping them off: this is a very mistaken notion; for they crowd to the attack, and fasten on quicker than they can be removed. I do not exaggerate when I say that I have occasionally seen at least fifty on a person at a time. Their bites are much more troublesome than could be imagined, being very apt to fester and become sores; and, in persons of a bad habit of body, to degenerate into extensive ulcers, that in too many instances have occasioned the loss of limb, and even of life.”

ON THE ORIGINAL SOURCE OF THE DOMESTIC CAT.

[Translated from Temminck’s ‘Monographies de Mammalogie,’ vol. i. p. 76.]

“WHILE speaking of the Domestic Cat,—which is met with in every part of the globe where man, in different states of civilization, has been collected into societies, and has become accustomed to the use of fixed habitations,—we may naturally consider the question of the origin of its domestication, and endeavour to ascertain the original or typical species to which the different races of it owe their existence. Many very ju-

dicious naturalists have had doubts respecting the source to which our cats have generally been referred. The opinion which has been received and adopted by the greatest number is, that the wild cat of the forests of Europe and Asia ought to be considered as the original stock of all the races of domestic cats. But the consideration of this point gives rise to a doubt, which a comparison between our house cat and this, its supposed wild type, tends to strengthen.

“When we attempt to trace the domestication of the cat up to its commencement, our thoughts are naturally directed towards those countries in which the earliest marks of civilization appeared. It was from the walls of the Temples of Isis, and under the dominion of the Pharaohs, that the first rays of knowledge burst forth, which, after being so successfully cultivated by the Greeks in later times, was gradually transmitted from them to the countries which we now inhabit. Egypt, which beheld the beginning of this civilization, without doubt furnished its inhabitants with this useful animal. The ancient Egyptians would value the good qualities of the cat more than any other agricultural people. If, then, they were acquainted with it, (and everything leads us to the belief that they were,) it is evident that a wild species peculiar to those countries has supplied the first domestic race.

“In fact, the Egyptian cat, which we have described in this work under the name of *Felis gauté* (*Felis maniculata*), has a much greater resemblance to our house cat than the latter has to the wild cat of the woods; the height and the figures are perfectly similar, the tail is of the same length, and is thinner in both at the extremity than at the root. Our domestic cats of the largest kind are always smaller than the wild species, and there is also a permanent difference in the form of the tail. We know by experience that a long-continued state of domestication affects the size and the whole physical system of an animal. A superabundance of nourishment and constant attention assist the development of all their organs, and increase their size. All our animals removed from a wild state, and domesticated, furnish us with proofs of this. The domestic cat, upon the supposition that it is a descendant of the wild cat of the woods, would furnish a proof of the degeneration of its race, a constant forerunner of the entire destruction of it.

“When we compare the exterior form of the domestic cat with that of the wild species, we invariably find that the former is smaller; that its tail is longer, and terminated in a point; while the tail of the wild cat is much shorter in proportion to the size of the animal, and seems as if the end had been cut off, being of the same size at both extremities.

The size of the Egyptian cat, our *Felis gauté*, is less than that of the house cat; the tail bears the same proportion to the body, and is of the same shape as that of the common cat. We see, in fact, an agreement in the general appearance of the figures of this Egyptian *Felis* and our Cat, and that there is a permanent difference between the latter and the wild species of the forests of Europe and Asia."

POWER OF SCENT IN THE REIN-DEER.

[Extracted from Capell Brooke's 'Winter in Lapland and Sweden.]

"IN proceeding along the extensive and endless lakes of Lapland, if the number of deer be great, a close and lengthened procession is invariably formed; each deer following the foremost sledge so closely, that the head of the animal is generally in contact with the shoulders of the driver before. Should the guide alter his direction, by making a bend to the right or left, the whole of the deer in the rear will continue their course till they arrive at the spot where the turn was made. It thus frequently happens, that when the distance between the foremost and hindmost deer is great, on the guide making a bend, considerable saving might be obtained by cutting across. This, however, it is scarcely possible to do; for should the deer even be pulled by main force out of its former course, it will immediately turn aside from the new direction it is placed in, and regain the old track, in spite of all the driver can do to prevent it. It is useless to contend with the animal; and the time thus lost might leave the driver at such a distance from the rest of the party as to render it a matter of some difficulty to overtake them. This unwillingness to separate from its companions is one feature of the instinct given to this animal; and it is the very circumstance that, more than any other, ensures the safety of the traveller. Should any accident separate him from the rest of his party, the deer be fatigued, or other occurrences throw him considerably in the rear, if he trust entirely to his deer, it will enable him to overtake the rest, though they should be some miles in advance, from the exquisite olfactory sense it possesses. The animal in this case, holding its head close to the snow, keeps frequently smelling, as a dog would do to scent the footsteps of its master, and is thus enabled to follow with certainty the track the other deer have gone. Were it not for this property of the animal, travelling across Lapland would be not a little hazardous, particularly in those parts where the weather is the darkest, which is generally while crossing the mountains of Finmark. It often happens that the party is unavoidably scat-

tered, and the sound of the bells enables them to rejoin each other. The bells however, should the weather be very thick and stormy, can only be heard a short distance off ; and it is then by the sagacity of the deer alone that the difficulty is surmounted."

THE PROBOSCIS-SEAL, OR SEA-ELEPHANT, (*Phoca proboscidea*, Péron.)

[Concluded from page 152.]

"THE greater part of the known species of Seal prefer rocky places for their habitation ; but the Proboscis Seal, on the contrary, is found exclusively on sandy shores ; it seeks the neighbourhood of fresh water ;—not that this is essential to its existence, but because the animals of this species delight to plunge into it, and suck it up with pleasure. They sleep equally well stretched at length upon the sand, or floating in the sea. When they are congregated in large herds to sleep on shore, one or more individuals are constantly on the watch. On the approach of danger these centinels give the alarm to the rest of the band, when the whole scuffle together to regain the sea, and throw themselves into the midst of the protecting waves.

"Nothing is more singular than the gait of these animals ; it is a sort of crawling, performed entirely by the anterior extremities ; and the body at every motion appears to tremble like an immense bag of jelly, so thick is the layer of blubber which envelopes them. Not only is their gait slow and painful, but they are compelled besides to rest every fifteen or twenty paces, panting with fatigue, and succumbing beneath their own weight. If, during their flight, any one places himself in front of one of them, it instantly makes a stop ; and if, by repeated blows, it is compelled to move on, it seems to suffer greatly : the most remarkable thing that is observable in this case is, that the pupil of the eye, which in the ordinary condition is of a light blueish green, becomes then of a very deep red colour. Notwithstanding this slowness and difficulty of their progressive motion, the seals contrive to climb over sandy downs from fifteen to twenty feet in height, beyond which they find the little pools of fresh water ; their patience and perseverance compensating for their want of agility and address.

"The cry of the females and of the young males has a near resemblance to the bellowing of a strong ox ; but in the adult males, the tubular prolongation of the nostrils has such an effect on their voice, that the noise they make has some re-

semblance in its nature to that of a man when he gargles. This hoarse and singular cry is heard from a great distance ; it carries with it something wild and fearful ; and when in the middle of the stormy nights of which we spoke in the preceding chapter, we found ourselves suddenly awoke by the confused roarings of countless colossal forms, which covered the sands in the vicinity of our tents, it was with difficulty we could repress a feeling of uneasiness and apprehension, which nothing, indeed, but the certainty of the real impotence of these creatures could dissipate.

“ Whilst the periodical migrations of the proboscis-seal clearly prove that it is obnoxious to too great heat, there is also another circumstance in its habits which equally indicates this repugnance. When one of these creatures reposes at full length along the sand, and finds itself incommoded with the sun’s rays, it may be seen repeatedly lifting with its fore-flippers great quantities of sand moistened with sea water, and throwing the same over its body until it has completely covered itself. It is in this state that we are apt, with Foster, to take the sea-elephants for so many large rocks.

“ The greater part of the external senses seem possessed of little subtlety in these Amphibia. The flattening of the eye, the very remarkable density of the vitreous humour, as observed by M. de Labillardière, the not less extraordinary density of the crystalline lens,—all indicate that the organ of vision, though perfectly adapted to the nature of the denser medium in which these animals are especially destined to exist, is on that account less calculated to be of use to them in another element ; so we find them, especially on first quitting the sea, unable to distinguish objects except at very short distances. With respect to the ear, the deficiency of auricles contributes perhaps to the deterioration of their sense of hearing, which seems to be but dull.

“ The sea-elephants are of an extremely easy and gentle disposition ; one may wander among them without fear ; and they never attempt to hurt any one, unless when attacked, or provoked in a very violent manner. It is not only on shore that they manifest this character of mildness and innocence ; we have been told by the fishermen that young seals of a much smaller species than the present are frequently seen swimming in the midst of these amphibious monsters, without their offering the slightest injury to the feeble strangers. Even men may bathe with impunity in the waters where the sea-elephants congregate, without having anything to fear, and the fishermen are accustomed to do so.

“ It would seem also that these animals are susceptible of a real attachment, and of a kind of peculiar education. An

English fisherman (soon after their first arrival on the island,) having taken a liking to one of these Mammalia, prevailed upon his comrades to abstain from injuring his protégée. For a long time in the midst of the work of slaughter, this seal lived peaceful and respected. Every day the fisherman approached to caress it, and in a few months it was so completely tamed, as to permit its master to ride on its back, or thrust his arm down its throat ; it would come to him when called ; and in a word, this docile and affectionate animal did everything for its protector, and suffered him to do what he pleased with it without manifesting any sign of offence. Unfortunately this man having had a slight altercation with one of his comrades, the latter, in a cowardly and ferocious spirit of revenge, killed his adversary's adopted favourite.—The sea-elephant, however, is not the only seal which is distinguished by a character of intelligence and gentle bearing : most of the other species of the same family participate in this disposition ; and authors have preserved many traits similar to that we have just related. But peaceable and good-natured as the proboscis-seals undoubtedly are, we may be permitted to doubt whether they are sufficiently so to suffer the treatment which Pérouse asserts they experienced from his crew. 'They mounted,' says he, 'on these animals as upon horses, and when they would not move quick enough, they goaded them on with their knives, piercing and cutting their skin.'

With respect to the term of life of these seals, the English have not been able to give me any very precise notions ; but they are inclined to believe, from the great numbers which are seen to die a natural death on the shores, that the average period of their existence does not extend beyond twenty-five or thirty years. We have thus an additional proof of the generally admitted rule, that '*the duration of life is proportionate to the period of development, being so much the shorter as the latter is more rapid.*'

The most remarkable circumstance attending the period which terminates the career of the animals of which we have been speaking, is the following. As soon as they feel themselves sick, they quit the waves, advance into the interior of the island further than ordinary, lie down at the foot of some shrub, and there remain until they expire, never attempting to return to the sea, but seeming desirous to quit life in the same element in which they first received it. What makes the fishermen conclude that death in this case is natural, is, that without exhibiting any trace of wound or contusion, they seem to suffer greatly, and in fact expire at the end of a few days. Steller has made similar observations on the seals of the northern seas.

“ In the midst of the stormy oceans they inhabit, the proboscis-seals have also other accidents to dread than diseases and old age. Sometimes, surprised by storms, and borne away by the currents and the waves, they are driven against the rocks and dashed to pieces. I myself witnessed, on that terrible night when our vessel lost its anchors and its long-boat, and was so nearly wrecked, two of these animals beaten to pieces upon the masses of granite which formed Point Plumier in Elephant’s Bay. Other perils await them in the depths of the sea ; sometimes, say the fishermen, we see them unexpectedly rise with every symptom of alarm from the bosom of the ocean, often covered with enormous wounds, and staining the sea with their blood ; their terror, and these wounds, prove that they have been pursued by one or more redoubtable enemies. What should be these terrible adversaries ? The fishermen agree unanimously that no animal they know could inflict wounds of such magnitude and depth ; they only presume that these monsters inhabit the depths of the sea far from the coasts, but have never found a trace of them : they add, that it is without doubt to preserve their young that the proboscis-seals take such pains to prevent them wandering too far, or diving too deep, as we have before observed.

“ A much more terrible enemy awaits these animals on land, —it is man. We have had occasion to remark that some individuals are carried by currents, or driven by storms, upon the continent of New Holland, or Van Diemen’s Land. No sooner do the savages of these regions discover one of these creatures, than they surround’it : in vain it strives to regain the sea ; all retreat is cut off ; the savages, armed with long staves of wood, lighted at one end, assault the unfortunate castaway : no sooner does he open his mouth to menace them with the only arms Nature has given him, than they thrust together down his throat many of these burning torches. The amphibious giant utters loud groans, agitates with violence his enormous frame, and quickly expires, suffocated by the painfully arrested respiration. Then the cries of joy arise on all sides, the ferocious victors collect around their victim ; they tear him up in all directions, and every one eats, sleeps, awakes, and eats and sleeps again. This abundance attracts and unites together tribes which ordinarily are the most hostile to each other, and their hatred then seems extinguished ; but by the time the last decomposing remnants of their prey have been devoured, their resentments revive, and murderous combats ordinarily close these disgusting orgies. Some years ago, in the neighbourhood of Port Jackson, a scene of this nature took place amongst the savages of the County

of Cumberland, occasioned by the stranding of an enormous whale, over the bones of which they slew each other.

“ The sea-elephants, guided by a prudent instinct, had hitherto succeeded in escaping the fury of the human race. Withdrawing to wild and solitary islands, far from the places inhabited by man, these huge seals were enabled, without enemies and without alarm, to multiply and increase. But circumstances are completely altered now ; even if it were possible for them to find a retreat against the voracity of the natives of these climates, they could not escape an insatiable mercantile avidity, which seems to have sworn the annihilation of their race. In short, the English have invaded these retreats, so long their places of safety ; they have everywhere organized such massacres, as must inevitably in a little while occasion a marked and irreparable diminution of these animals.

“ The English fishermen use for the purpose of killing them a lance of from twelve to fifteen feet in length, the iron head of which is extremely sharp, and from twenty-four to thirty inches in length. They seize with adroitness the moment when the animal, in order to move forward, lifts up its left fore-fin, beneath which they plunge the lance so as to pierce the heart, which they rarely fail to hit. The unhappy amphibian quickly falls, pouring out oceans of blood.

“ However mild and peaceable these animals habitually are, it is always necessary to view their motions with the greatest attention when about to strike them ; for, as if aware of the fate with which they are threatened, they summon all their vigour to fall upon their murderers. Lord Anson lost one of his sailors, who died a few days after having his skull fractured by an infuriated seal. But, in general, the defence which these creatures offer is very feeble ; their enormous bulk serves only to embarrass them, and their teeth have little that is formidable but their appearance. In vain they open widely, as if by instinct, their monstrous mouth, bristled with threatening tusks. These weapons, so terrible in themselves, are put in motion by levers so cumbrous and unwieldy, that the animal can rarely draw from them any other advantage than the dread which the first sight of them inspires.

“ The female seals rarely oppose violence to their assailants ; they have received, indeed, other means of defence, but more powerless than those of the males. No sooner do they find themselves attacked, than they endeavour to escape by flight ; but if their retreat be cut off, they shake themselves with violence, their countenance bears the expression of despair, and they burst into tears. I have myself seen one of these young females shed tears abundantly, whilst one of our sailors, a

wicked and cruel man, amused himself with breaking her teeth with the end of an oar every time the poor creature opened her mouth. Steller, that talented observer of the seals of the northern hemisphere, has recounted some curious details respecting the same signs of grief which a species of northern seal (*Otaria ursina*) also exhibits. A female happened to be beaten by one of the males : 'This unhappy creature,' says Steller, 'crept before him like a worm, she kissed him (*ex-osculabatur*), and shed such abundance of tears, that they flowed down her chest, as if from a vessel.'

"In the massacres of which we have been speaking, there is a circumstance which takes away from the character of generosity by which the proboscis-seal is distinguished, and which seems entirely opposed to the principle that maintains these animals united together in a family,—it is the cold indifference which they at that time manifest towards each other: not only, indeed, is every attempt at mutual defence abandoned, but those even which survive seem not to perceive the work of destruction which is going on around them. When the blows which they receive are not immediately mortal, and they feel themselves severely wounded, instead of returning to the sea, they drag themselves inland, as far as their powers will enable them; there they rest at the foot of a tree, and remain till they expire. This remarkable habit, which we before mentioned when speaking of the diseases of the sea-elephant, is also observed in the sea-lion of the North (*Phoca jubata*); which, when it finds itself mortally wounded in the sea, quits that element to die on the land. Krachen-nikow has made the same observation on the seals of Kam-schatka. However easy and prompt may seem the manner in which the English fishermen slay the sea-elephants, it is not the most expeditious nor the most simple; they practise it rather with a view of causing an effusion of blood, in order to improve the oil which they prepare. In fact, were it not that navigators have repeated the observation on almost every species of seal, without excepting that which we have been describing, one should hardly be tempted to believe that a few blows, nay, sometimes a single blow of a stick forcibly applied to the end of the nose, is sufficient to kill them in an instant. The ancients were long ago aware of the slight tenure on which the seals held their existence.

'Non hami penetrant Phocas, sævique tridentes
In caput incutiunt, et circùm tempora pulsant
Nam subitâ pereunt capitis per vulnera morte.'—OPPIANUS.

"The capture of these animals," says Frezier, "is attended with little difficulty; they are easily overtaken on shore, and are killed by a single blow on the nose."

“ When one sees a brutal sailor armed with a heavy stick, running sometimes for his amusement in the midst of these marine herds, slaughtering as many seals as he chooses to strike, and in a short time surrounded by their carcasses, one cannot help lamenting that Nature should have left these powerful, yet gentle and unfortunate creatures, such easy victims to the attacks of their enemies. This stunning of the seal by a blow on the muzzle, like a stroke of lightning, is, however, one of the most singular phenomena of animal physiology.

“ On opening the stomachs of those which are killed, they are commonly found to contain a great number of the beaks of cuttle-fish, a good deal of sea-weed, as well as stones and gravel ; but the remains of fishes, or of other vertebrated animals, are never found there. I ought here to observe, that, notwithstanding the assertions of the older voyagers, it is not true that these animals browse on the shore-side herbage, or pluck the leaves of certain trees : the English fishermen positively deny it, and we never saw anything like it ourselves.

“ With respect to the stones which are commonly found in the stomach of the proboscis-seal, this occurs in most of the *Phocidae*. Sometimes these stones are so numerous and large, that one can hardly conceive how the parietes of the stomach can contain them without being torn by their weight. In a species of seal (*Otaria cinerea*) at the Isle of Decrès, I found thirty-three stones of different weights accumulated in that cavity.

“ It is not on account of the quality of the flesh, that the periodical fisheries of the sea-elephants have been established ; this is not only insipid, oily, and black, but it is almost impossible to detach it from the layers of fat which surround it. The tongue is the only part which furnishes tolerable food ; and the fishermen salt them with great care, and sell them at high prices. Our sailors also ate the heart, but I thought it very hard and indigestible food. With respect to the liver, which is esteemed in many species of seal, it would seem to have in the sea-elephant some noxious property ; for the English seamen, after having eaten of it, were overcome with a stupifying drowsiness which lasted several hours, and returned every time that they tasted this noxious aliment. The fresh blubber of the proboscis-seal holds a great reputation among the sailors for the healing of wounds ; and they attribute to it the rapid cicatrization of the deep wounds the seals themselves receive during their combats ; the English never use any other means in the daily and often severe cuts they receive whilst skinning these animals and slicing away the fat, &c. : nothing, they say, can exceed the promptitude with which these wounds heal.

“As soon as the animal is killed it is skinned, then with large and very sharp knives the fat is removed in long slices, much in the same way as is practised by the whalers; these slices are then cut into small cubes, which are rendered over a slow fire in immense cauldrons arranged for that purpose along the shores; when it is sufficiently melted, the oil is poured into casks. All this operation is so rapid and easy, that ten men established on the Isle of King might easily procure 3000 pounds of oil daily, including the time employed in killing the seals, skinning them, and preparing the blubber. We found, indeed, that all the casks these men had brought had been for some time filled when we arrived at the Isle of King, and the commander of the establishment complained that his employers had not furnished him with a twentieth part of what he could have filled.

“The quantity of oil yielded by each of these seals is pretty constantly proportionate to the bulk of the animal, whatever its sex or age may be; but it is remarkably small in all the individuals during the period of giving birth to and suckling the young, when both males and females remain for many weeks consecutively without taking any nourishment. With respect to the quality of the oil, we could not observe any difference between that furnished by the young and old, the male and female,—it was equally good in all. As it is prepared by the English sailors, this oil is clear, inodorous, and does not contract that rancid flavour, of which you can never deprive the oil of whales or fishes. Whatever kind of food it is employed with, it never communicates to it any disagreeable flavour. When used in a lamp it furnishes an extremely pure and clear flame, without the smoke or disagreeable smell which most animal oils give out: it also supports a given quantity of flame for a longer period. These details were communicated to us by the English fishermen, and we were enabled to assure ourselves of their accuracy upon a quantity of the oil which their captain, the brave Cowper, forced us to accept at our departure.

“The whole of this oil is destined for the ports of England. It is there employed for various purposes of economy, but particularly in the cloth manufactories, for the softening of the wool, &c. It is sold, we were informed, at six shillings and sixpence the gallon. It appears certain, from the observations of Mortimer, that the importation of this substance into China would be productive of great advantage, and I have no doubt it will soon become to the English a new and valuable article of exchange.”—Péron, ‘*Voyage de Découvertes aux Terres Australes*,’ tom. ii. p. 32.

CLASSIFICATION OF MAMMALIA.

WE propose in the following pages to lay before our readers a sketch of the principal methods which have been adopted for the classification of the Mammalia.

Animals in general are distinguished from every other form of matter by possessing sensation ; for although nerves have not been detected in some of the more minute and simple forms, yet the living phænomena of these, when attentively studied, sufficiently indicate the existence of this faculty. Every animal has been observed, at least at some period of its existence, to exhibit spontaneous locomotion. An internal digestive cavity or stomach is a third characteristic of this division of organized matter.

Various—almost infinitely various—as are the outward configurations of animals, it has been observed that they are reducible to four principal forms :—1st, A radiated form, as in the polype and star-fish ; 2nd, A jointed symmetrical form, as in the worm and insect ; 3rd, An irregular and mostly unsymmetrical form, where the body is soft, as in the oyster and snail ; 4th, A symmetrical form, supported by an internal jointed column or spine. The last, which is called the vertebrated division of animals, is divided into fishes, reptiles, birds, and mammalia.

The animals of the latter group are those which have always attracted most attention from mankind ; since it is from them that we draw the greatest services, and in them we observe the properties of animal life manifested in the highest degree. The mammalia were first separated from other animals and distinguished as a Class by Aristotle, the founder of Natural History, by whom they were denominated *Zootoka*, or viviparous animals.

One of the most learned and acute naturalists of the present age (Mr. W. S. MacLeay,) has reduced Aristotle's subdivisions of this Class into a tabular form *, which may be contrasted, without the least disadvantage, with the classifications of the best modern systematists.

The Greek philosopher first arranges the *Zootoka*, according to the nature of their locomotive organs, into three sections :—1st, *Dipoda*, or bipeds ; 2nd, *Tetrapoda*, or quadrupeds ; and 3rd, *Apoda*, or impeds, which comprehends the whale tribe.

The second of these primary divisions, which includes by far the greater part of the Class, and, in common language, is considered as the Class itself,—the quadrupeds,—Aristotle

* Linn. Trans., vol. xvi. p. 24.

subdivides into two great natural groups, according to the modifications of the organs of touch. In the first of these groups, a part of the digits, or last divisions of the members, is left free for the exercise of that faculty, the nail or claw being placed upon one side only; in the second group, the digits are inclosed in hoofs.

For the convenience of treating of the different forms of the unguiculate quadrupeds, Aristotle employs for their further subdivision another system of organs; viz. the teeth. His first group or family is composed of those which have the front teeth trenchant, or terminating in an edge, and the back teeth terminated by a flattened surface, as the apes (*Pithecoidea*), and the bats (*Dermaptera*): his second family includes the quadrupeds with acuminate, trenchant, or carnivorous teeth, the *Karcharodonta*; whilst the Rodent quadrupeds, or *Glires* of Linnaeus, are also indicated by a negative dental character.

With respect to the hooved or ungulate quadrupeds, Aristotle continues to employ the organs for progressive motion for the subordinate characters, and divides them into, 1st, the *Poly-schidæ*, or multungulate quadrupeds, as the elephant, &c.; 2nd, the *Dischidæ*, or bisulcate quadrupeds, including, with the ruminants, the hog; 3rd, the *Aschidæ*, or solidungulate quadrupeds, as the horse and ass.

The apodal vivipara, which form the third of Aristotle's more comprehensive groups, has undergone no further division by him. It embraces the Cetacea (*Ketoda*), and affords, by its position in his system, one of the most striking examples of his sagacity and penetrating genius.

It is to be observed, however, that although Aristotle has arranged animals in groups which, in their relative value and comprehensiveness, agree with the modern *Classes, Orders, Genera, Species, and Varieties*, yet he applies to each of them the same denomination; viz. *genos*, or genus.

From the time of Aristotle to the period of our great countryman Ray, we find no improvement or modification of any consequence in this arrangement. The honour of having proposed the second original scheme for the classification of quadrupeds is due to him. This classification is given in a tabular form in his '*Synopsis Methodica Animalium Quadrupedum*', and is as follows:—

“A Table of Viviparous Four-footed Animals.

Viviparous hairy animals or quadrupeds are,—

Ungulate, and these either *of Solidi* *done* as the Horse Ass Zebra

Solitarius, as the *Bivalvata*, which are

Diseases, which are of *Ruminants* with horns, that are Persistent, as in the Ox. *Sheep*. *Goat*.

or
or
or
or

2. Deciduous, as in the STAG.

Not Ruminants, as the H.O.G.

Quadrisulcate, as the Rhinoceros, Hippopotamus.

ite, whose feet are either
(Bifid) as in the C

Byhd, as in the CAMEL, or
Multifid, which are

(*minyū*), which are With digits adh

With *any* *two* *visible* *at* *the*

digits in some measure di-

Depress

or

Compressed, where the incisor teeth are
G. Many in which grown all the

Many, in which group all the animals are carnivorous and rapacious, or at least insectivorous, or subsist on insects with vegetable matter:

The larger ones with the Muzzle short, and head rounded, as the Feline tribe; or

with the } *Muzzle long, as the Canine tribe;*
 or } }

The smaller ones with a long slender body, and short extremities, as the Weasel or Vermine* tribe;

Two very large, of which tribe all the species are phytivorous, as the *Hare*.

* Genus *Vermineum*, from their worm-like form.

“The anomalous species,” he afterwards observes, “among the viviparous quadrupeds with a multifid foot are the Hedgehog, the Armadillo, the Mole, the Shrew, the Tamandua, the Bat, and the Sloth. The first five of these species agree with the *canine* and *vermine genera* in their elongated muzzle, but differ from them in the form and disposition of the teeth: the Tamandua, indeed, is altogether destitute of teeth: the remaining two anomalous species have the muzzle shortened.”

Linnæus, like Aristotle and Ray, founds his primary divisions of the Class Mammalia on the locomotive organs; but his secondary divisions or orders are taken chiefly from modifications of the dentary system. The following is the scheme of his arrangement:—

MAMMALIA.	Unguiculate	Front teeth, none in either jaw.	BRUTA.
		Front teeth, <i>cutters</i> 2, <i>laniaries</i> 0.	GLIRES.
	Ungulate ..	Front teeth, <i>cutters</i> 4, <i>laniaries</i> 1.	PRIMATES.
		Front teeth, <i>piercers</i> (6, 2, 10), <i>laniaries</i> 1.	FERÆ.
		Front teeth, in both upper and lower jaw.	BELLUÆ.
		Front teeth, none in the upper jaw.....	PECORA.
		Teeth variable.....	CETE.

(From the ‘*Systema Naturæ*,’ ed. xvi. Holmiae, p. 24.)

On comparing the three preceding systems, it will be found that the most important errors of arrangement have been committed, not by Aristotle, but by the modern naturalists. Both Ray and Linnæus have mistaken the character of the horny parts enveloping the toes of the elephant, which do not defend the upper part merely, as is the case with claws, but embrace the under parts also, forming a complete case or hoof.

With respect to Linnæus, however, it must be observed, that although he has followed Ray in placing the elephant in the unguiculate group of quadrupeds, he has not overlooked the great natural divisions which the latter naturalist adopted from Aristotle, as is evident from the Table above quoted. He erred, perhaps, in not giving names to those primary divisions.

From the manner in which Linnæus has arranged his Orders in this Table, it would seem that he had the circular progression of affinities in view. The Walrus among *Bruta* connects the commencement of the chain with *Cete*, which forms the last link; but whether or not he had perceived the affinity of *Elephas* to the *Glires*, and intended it as the transitional genus to that Order, as Cuvier has subsequently shown, is less certain.

We shall now proceed to the arrangement of the Mammalia proposed by Cuvier in the last edition of the ‘*Règne Animal*;’ and this is the more interesting, as, in giving the out-

line of his method, he develops the principles on which his divisions are founded.

“ The characters by which Mammalia differ most essentially one from another are derived from the organs of touch, from which results their degree of dexterity, and from the organs of mastication, which determine the nature of their food ; and, as a corollary to these, depends not only everything which is connected with the digestive functions, but a variety of other circumstances relative even to their degrees of intelligence.

“ The perfection of the organs of touch is estimated by the number and mobility of the digits, and the extent to which they are inclosed in a claw or in a hoof. A hoof which completely incloses that part of the digit which touches the ground, precludes the exercise of it as an organ of touch or of prehension. The opposite extreme is where the nail, in the form of a simple lamina, covers only one side of the end of the digit, leaving the other side in possession of all its delicacy of tact.

“ The kind of food is indicated by the molar teeth, to the form of which the articulation of the jaws invariably corresponds.

“ For cutting flesh, the molar teeth must be trenchant and serrated ; and the jaws fitted together, so as to move like the blades of a pair of scissors, simply opening and closing in the vertical direction.

“ For bruising grains and roots, the molar teeth must have flattened crowns, and the jaws a horizontal motion : and further, that the grinding surface may be always unequal, like a millstone, the teeth must be composed of substances of different degrees of density, and consequently wearing down in different proportions.

“ The ungulate quadrupeds are all of necessity herbivorous, or with flat-crowned molaries, because the conformation of their feet does not permit them to seize living prey.

“ The unguiculate animals are susceptible of more variety. They are not limited to one kind of food ; and, besides the consequent variation in the form of their molaries, they differ materially from each other in the mobility and sensibility of their digits. There is, moreover, a characteristic which prodigiously influences their dexterity, and gives variety to their modes of action : it is the faculty of opposing a thumb to the other fingers, so as to seize the smallest objects, which constitutes a *hand*, properly so called. This faculty is carried to its highest degree of perfection in man, in whom the whole anterior extremity is free, and can be exclusively employed in prehension. These different combinations, which strictly determine the nature of the several mammiferous animals, have

formed the grounds for their distribution into the following Orders :—

“ Amongst the Unguiculate animals, the first is *MAN*, who, in addition to his peculiar privileges in every other respect, is distinguished zoologically, by possessing hands on the anterior extremities alone; the posterior extremities being destined to sustain him in the erect position.

“ The Order which comes nearest to *Man*,—that termed *Quadrupana*,—has hands on the four extremities.

“ Another Order, termed *Carnivora*, has not the thumb free and opposable to the anterior extremities.

“ These three Orders possess likewise severally the three kinds of teeth, viz. molaries, laniaries, and incisors.

“ The quadrupeds of the fourth Order, viz. the *Rodentia*, have the digits differing little from those of the *Carnivora*; but they want the laniary teeth, and have the incisors of a form and disposition altogether peculiar to themselves.

“ To these succeed the animals whose digits now become much cramped, being sunk deep in large and, most commonly, crooked claws. They are further defective in the absence of incisor teeth; some of them even want the laniaries, and others are altogether destitute of dentary organs. We shall comprehend them under the term *Edentata*.

“ This distribution of unguiculate animals would be perfect, and would form a very regular chain, if New Holland had not lately furnished us with a small collateral chain, composed of the *Marsupial* animals, all the genera of which, while they are connected by a general similarity of organization, at the same time correspond in their dentition and diet, some to the *Carnivora*, others to the *Rodentia*, and a third tribe to the *Edentata*.

“ The Ungulate animals are less numerous, and present fewer variations of form.

“ The *Ruminantia*, by their cloven feet, their want of upper incisors, and their complicated stomach, form a very distinct Order.

“ All the other quadrupeds with hoofs might be united into a single Order, which I would call *Pachydermata* or *Jumenta*, the elephant excepted, which might form an Order of itself, having some remote affinities to the Order *Rodentia*.

“ Last of all come the *Mammalia* which have no hinder extremities, and whose fish-like form and aquatic life would induce us to form them into a separate Class, if their œconomy was not in every other respect the same as in the Class in which we shall leave them. They are the warm-blooded fishes of the ancients, or the *Cetacea*, which, combining the powers of other *Mammalia* with the advantage of being sustained upon the

watery element, include the most gigantic forms to be found in the whole animal creation."—*Règne Animal*, 2nd edit., p. 65.

Having thus laid before our readers the principles which have guided four of the most original writers on Natural History in their primary arrangement of Mammalia, we shall next subjoin a short tabular view of the genera or minor groups included by Linnæus and Cuvier in their respective Orders.

The System of Mammalia of Linnæus, from the 12th edition of the 'Systema Naturæ.'

A. Unguiculata.

I. PRIMATES.

Fore-teeth cutting; upper ones parallel, 4; *laniaries* solitary. *Teats* pectoral, 2. *Food*, fruits, except a few which use animal food. 1. *HOMO*. 2. *SIMIA*. 3. *LEMUR*. 4. *VESPERTILIO*.

II. BRUTA.

Fore-teeth none in either jaw. *Feet* with large nails. *Food* mostly vegetables. 5. *ELEPHAS*. 6. *TRICHECUS*. 7. *BRADYPOUS*. 8. *MYRMECOPHAGA*. 9. *MANIS*. 10. *DASYPUS*.

III. FERÆ.

Fore-teeth conical, usually 6 in each jaw; *laniaries* long; *molaries* pointed, conical. *Food*, carcasses and living prey. 11. *PHOCA*. 12. *CANIS*. 13. *FELIS*. 14. *VIVERA*. 15. *MUSTELA*. 16. *URSUS*. 17. *DIDELPHIS*. 18. *TALPA*. 19. *SOREX*. 20. *ERINACEUS*.

IV. GLIRES.

Front teeth cutting, 2 in each jaw. *Food*, bark, roots, vegetables, which they erode or gnaw. 21. *HYSTRIX*. 22. *LEpus*. 23. *CASTOR*. 24. *MUS*. 25. *SCIURUS*. 26. *NOCTILIO*.

B. Ungulata.

V. PECORA.

Fore-teeth cutting, many in the lower jaw, none in the upper jaw. *Feet* bisulcate. 4 stomachs. *Food*, herbs, which they pluck, and afterwards ruminate. 27. *CAMELUS*. 28. *MOSCHUS*. 29. *CERVUS*. 30. *CAPRA*. 31. *OVIS*. 32. *BOS*.

VI. BELLUÆ.

Fore-teeth obtuse. *Tread* heavy. *Food*, vegetables. 33. *EQUUS*. 34. *HIPPOPOTAMUS*. 35. *SUS*. 36. *RHINOCEROS*.

C. Mutica.

VII. CETE.

Teeth in some horny, in others bony. In place of *Feet* they have pectoral fins without claws; and a horizontal flattened tail. *Nostrils* terminating in 1 or 2 fistulous apertures at the anterior and upper part of the head. *Food*, mollusca and fish. 37. *MONODON*. 38. *BALÆNA*. 39. *PHYSETER*. 40. *DELPHINUS*.

The System of Mammalia of Cuvier, according to the 2nd Edition of the 'Règne Animal.'

A. Unguiculata.

Sect. a. With three kinds of teeth.

I. BIMANA.

1. HOMO.

II. QUADRUMANA.

1. *Simiæ*, incisors 4 in each jaw, erect; nails flattened.

α. Inhabiting the Old World; *molaries* 5 on either side of each jaw.

PITHECUS, &c.

β. Inhabiting the New World; *molaries* 6 on either side of each jaw.

CEBUS, &c.

2. *Lemurini*, incisors more than 4 either in the upper or lower jaw, procumbent. LEMUR, &c.

III. CARNIVORA.

1. *Cheiropтера*, with membranous expansions between the fingers, and laterally between the extremities.

α. *Vespertilio*nes, with the bones of the anterior extremity disproportionately elongated. PTEROPUS, &c.

β. *Galeopithei*, with the fingers and toes of the same length. GALEOPITHECUS.

2. *Insectivora*, without lateral membranous expansions; *molaries* cuspidated.

α. With 2 long anterior incisors, the rest short, the laniaries small. ERINACEUS, &c.

β. With the incisors small, the laniaries large. CENTETES, &c.

3. *Carnivora*, incisors 6 in each jaw; *molaries*, some of them sectorial or trenchant.

α. *Plantigrada*. URSUS, &c.

β. *Digitigrada*. CANIS, FELIS, &c.

γ. *Amphibia*. PHOCA, &c.

IV. MARSUPIATA.

1. Incisors small; laniaries long; posterior *molaries* cuspidated. DELPHIS, &c.

2. Lower incisors 2, long; upper ones 6. Upper laniaries long and pointed; lower ones small. PHALANGISTA, &c.

3. Lower laniaries wanting; no thumb on the hind feet. HYPSTERYMNUS.

4. No laniaries. MACROPUS.

5. Lower incisors 2; no laniaries: upper incisors 6; 2 small laniaries. PHASCOLARCTOS.

6. 2 long incisors in each jaw; no laniaries. PHASCOLOMYS.

Sect. b. Without laniaries; 2 large incisors distant from the molaries.

V. RODENTIA.

1. With clavicles.

α. *Sciuridæ*, anterior digits 4, posterior 5; tail cylindrical and bushy.

- β. Muridæ, tail cylindrical, not bushy.
- γ. Pedetidæ, anterior digits 5, posterior 4.
- δ. Spalacidæ, anterior digits 5, posterior 5.
- ε. Castoridæ, tail flat and scaly.
- 2. With imperfect clavicles, or none.
 - α. Hystricidæ, body covered with spines.
 - β. Leporidæ, 2 small incisors behind the 2 superior large ones.
 - γ. Caviadæ, no character in common.

Sect. c. Without incisor teeth.

VI. EDENTATA.

- 1. *Turdigrada*; with a short muzzle. *BRADYPUSS*, &c.
- 2. Typical *Edentata*; with an elongated muzzle. *DASYPUSS*, &c.
- 3. *Monotremata*; with marsupial bones and a cloaca. *ORNITHORHYNCHUS*, &c.

B. UNGULATA.

a. Not Ruminants.

VII. PACHYDERMATA.

- 1. *Proboscidea*; with a proboscis: *incisors* projecting; *feet* pentadactyle. *ELEPHAS*, &c.
- 2. Typical *Pachydermata*; feet tetra-, tri-, or di-dactyle. *HIPPOPOTAMUS*, &c.
- 3. *Solipeda*; feet monodactyle. *EQUUS*, &c.

b. Ruminants.

VIII. RUMINANTIA.

- 1. Without antlers or horns. *CAMELUS*, &c.
- 2. With antlers. *CERVUS*, &c.
- 3. With horns. *ANTILOPE*, &c.

C. MUTICA.

IX. CETACEA.

- 1. *Herbivora*; teeth fitted for mastication. *MANATUS*, &c.
- 2. Typical *Cetacea*; teeth unfitted for mastication, or wanting. *DELPHINUS*, &c.

We shall conclude this article with quoting some observations by Mr. MacLeay on the analogies observable between the principal groups of Mammalia, and those into which the class of Birds is resolvable. "Every Mammiferous animal may be reduced to these five orders; that is, may be assimilated, in a greater or less degree, to one or other of the following typical forms; viz. Man, the Lion, the Horse, the Whale, and the Mouse. I shall show hereafter how these five orders form a continued series returning into itself, so as to be a natural group. In the mean time, I must recall to the attention of the reader the orders of Birds as defined and ar-

ranged by Mr. Vigors ; and to which definitions and arrangement I have just applied so severe a test, only to corroborate their accuracy, and to make them display additional harmony.

“ When we have heard the Parrot or Mainate speaking ; when we have witnessed the former feeding itself as it were with a hand ; when, in short, we have reflected on the remarkable intelligence and development of brain throughout the whole order of *Insessores*, to which both birds belong, —there has been no one, perhaps, dull enough not to compare them to *Primates* I allow, indeed, that it is difficult to follow the opinion of the great naturalist of France, who, ignorant of the true nature of relations of analogy, imagined that the Psittaceous tribe of Birds ought to occupy the first step in the scale of nature below Man ; but we cannot help adopting the notion of Linnæus in the ‘ *Systema Naturæ* ’, that although not near him in construction, they are yet analogous to him in various important respects. And, adopting this notion, we must place the whole order of *Insessores*, to which *Psittacus* belongs, opposite to the *Primates*, of which Man forms the type.

“ The analogies existing between Birds of Prey and Carnivorous quadrupeds having been noticed by Aristotle, who called both groups *Gampsonucha*, were enlarged upon by Plutarch. Among a host of moderns who have been struck with the resemblance, I may particularly mention Linnæus, who in his ‘ *Systema Naturæ* ’ has expressly called his Accipitres “ *Feris analogi* ” ; and Buffon, who has treated the subject at length and with his usual eloquence. I conceive, therefore, that no one can object to the propriety of my placing the *Feræ* opposite to the *Raptore*s.

“ The analogy between Aquatic Birds and Aquatic Mammalia scarcely requires the mention of the authority of Linnæus to make it be granted. It is indeed so evident, that Hermann, according to his custom, takes it for a relation of affinity. In both orders the anterior appendages of the vertebral axis dwindling into fins, and the two undivided posterior appendages being placed so far behind on the axis as to show that both were intended for motion in the water rather than on land, are circumstances of themselves sufficient to authorize the placing of the *Cetacea* opposite to the *Natatores*.

“ Two orders still remain in each class to be considered : the *Glires* and *Ungulata* among the Mammalia ; and among Birds, the *Rasores* and *Grallatores*. The relations of analogy pointed out by Linnæus between Mammalia and Birds are, as Hermann has observed, not always correct ; and his errors have arisen from the misfortune of his not detecting the natural group of Aristotle and Ray, which the latter has called

*Ungulata**. Having only been able to seize Aristotle's subdivisions of this group, he lost the parallelism of analogy, and fell, as I shall hereafter show, into very glaring mistakes. In the ' *Systema Naturæ*,' however, he has mentioned that very striking analogy which appears between his groups of *Grallæ* and *Bruta*; that is, according to the parallelism of analogy, between the orders of *Grallatores* and *Ungulata*, since the *Bruta*, as we have seen, do not form an order, but only a natural subdivision of the *Ungulata*. That this analogy is demonstrably true, I deduce from the following facts. Of their respective classes, the orders of *Ungulata* and *Grallatores* contain examples of the longest legs in proportion to the body,—witness *Camelopardalis* and *Hæmantopus*. Both orders present us, in groups not exactly aquatic, with instances of the toes soldered together, as in the Horse; or connected together by a web, as in the Flamingo. Both orders present us with the greatest elongation of muzzle or facies,—witness *Myrmecophaga*, or *Antilope* (particularly *A. Bubalus* L.), and *Scolopax*; and also with the most depressed form of muzzle,—witness *Hippopotamus* and *Platalea*, which genera also afford us the truest specimens of Wading *Vertebrata*. In both orders we have the most elongated claws,—witness *Megalonyx* and *Parra*. Both orders afford us the swiftest animals in running,—as the Horse and *Tachydrus*; and the most pugnacious on account of love,—as the Bull and *Machetes*. The Bull moreover and the *Butor* (or *Bostaurus*, for hence comes the bird's name,) afford us the loudest and hoarsest voice of their respective orders: where we have also the most remarkable instances of the upper and under mandibles touching each other merely at their base and point; as *Myrmecophaga*, or the whole of the $\tau\alpha\mu\epsilon\nu\text{ ουχ}\alpha\mu\phi\delta\sigma\tau\alpha$ of Aristotle, and *Anastomus* Illig. Both orders exhibit ornamental appendages to the head,—as the antlers of the Stag and the crown of the Crane; and both orders afford us the only instances of true horns,—as *Bos* or *Rhinoceros*, and *Palamedea* L. To see a hundred instances of resemblance, it is only necessary to walk into a museum. I shall therefore only further say, that both orders contain polygamous animals, are generally gregarious, and more graminivorous than granivorous, being essentially inhabitants of marshes and

* In making this assertion, Mr. MacLeay appears to have overlooked the tabular arrangement prefixed by Linnæus to the more extended characters of his Orders of Mammalia. The only fault in the construction of his *Ungulata*, is the exclusion of the elephant from that division; for with respect to the edentate *Bruta*, it may be questioned whether Linnæus and Cuvier are not after all correct in placing them among the Unguiculate Mammalia.

savannahs. Thus then, with Linnaeus, I place the *Bruta*, or rather the whole order of *Ungulata* to which they belong, opposite to the *Grallatores*.

“ Four orders in each class being now disposed of, it follows by parallelism of analogy, that the *Glires* ought to be placed opposite to the *Rasores*. But setting theory aside,—is this position true in fact * ?

“ Linnaeus, from the above-mentioned error in his series of affinity, considered the *Rasores* to be analogous to his group of *Pecora*. But this group, according to Aristotle and Ray, is only a subdivision of *Ungulata*, which have, I consider, been now proved to be analogous to the *Grallatores*. If, therefore, Linnaeus be right in making his *Bruta* analogous to the order of Wading Birds, it follows that his *Pecora* must be so also.

“ The analogy of the *Rasores* to the Ruminating Animals was first, I believe, mentioned by Linnaeus in the ‘ *Systema Naturæ*.’ It has since his days been copied and copied, until now it almost becomes a sort of heresy to inquire into its accuracy. I am not, however, aware that any reason for this analogy has ever been assigned, beyond the fact,—that one order affords the principal part of those birds which are domesticated by man for purposes of food; and the other, the principal part of quadrupeds which are destined to the same purpose. Now, granting even this domestication not to be the work of art, but to be an analogy really existing in nature, I would observe,—setting the whole family of *Anatidæ* aside,—that the *Glires* afford us many eatable or domesticated animals, such as the *Capromys* and Rabbit; and the *Grallatores* afford us similar instances in the Snipe and *Psophia*. If some *Rasores* be said, like the *Pecora*, to have ornamental appendages to the head, so it must be remembered has the Crowned Crane; whereas no rasorial bird is truly horned, like the *Palamedæa*. But it may be worth while to take into consideration successively the grand characteristics of the *Rasores*, as given by ornithologists to distinguish them from all other birds.

“ The *Rasores* are, properly speaking, frugivorous birds; by which I do not mean eating fruits only, but all manner of seeds or grain. Now this character of being frugivorous applies much more to the *Glires* than the *Ungulata*, which are truly herbivorous, and only feed on grain in an artificial or

* “ The ancient name of *Struthio Camelus*, as well as the form and habits of the Ostrich, show indeed a relation of analogy to the Camel; but then we are to recollect, in the first place, that the Ostrich is at the osculant point or confines of the orders of *Grallæ* and *Rasores*; and secondly, that such slight variations of the parallelism of analogy often appear, although I think it possible that even these are subject to rule.”

domesticated state. To begin, then, with the rassorial or scratching powers of gallinaceous fowls; these are certainly the most burrowing of frugivorous birds: now the most burrowing of frugivorous quadrupeds are certainly not the *Ungulata*, but the *Glires*. These birds are characterized by the shortness of their wings and the weakness of their pectoral muscles. Now if we inquire whether it is among the *Glires* or *Ungulata* that we find the corresponding appendages of the vertebral axis,—that is, the fore-feet most shortened,—the answer will be, certainly not among the *Ungulata*; where, on the contrary, the Giraffe has them extraordinarily lengthened: but among the *Glires* we have the Jerboa, in this respect almost a bird. In general, moreover, this latter order is distinguished, like the *Rasores*, by the strength of those muscles of the two posterior appendages of the vertebral axis or hind-feet, that contribute to locomotion. Gregarious habits distinguish the most of the *Rasores*; so they do in a still more extraordinary manner the *Glires*. Many are insectivorous in both orders, and some are omnivorous. The muzzle or facies of *Glires* is short and round, very like that of *Feræ*, there being a direct relation between the two orders. The facies of *Rasores* is also short and round, very like that of *Raptore*s (the order analogous to that of *Feræ*); and there is also a direct relation between these two orders. Many *Rasores* perch and nestle on trees; so do many of the *Glires*. The *Rasores* generally feed on hard grain, which they pick up with their hooked beak, and masticate in a triturating gizzard: the *Glires* feed also on hard substances, which they gnaw with their strong hooked incisors, and masticate with their grinders. In both orders the thumb is very often rudimentary. In both orders the tail varies from an extraordinary length, as in the Squirrel and Pheasant, to being very short, as in the Hare and Partridge. No orders in their respective classes present the tail so spread out and flattened as the *Glires* and *Rasores*,—witness the Beaver and Peacock. In both orders the sense of hearing is much developed. In both orders we find animals, such as Squirrels and Pigeons, with their toes perfectly free; and others, as *Hydromys* and *Phasianus*, which have them united at the base by a membrane. *Castor* is an aquatic animal, having some relation to *Cetacea*; *Struthio* is a terrestrial animal, approaching to *Natatores*. And so on relation comes so fast upon relation, that I know not how we can for a moment hesitate to place the *Glires* opposite to the *Rasores*.

“ I conceive it now to be demonstrated, that, so far as relates to the analogies existing in nature between the orders of *Mammalia* and *Aves*, we ought to place them thus :

Animals typically.

1. FERE carnivorous 1. RAPTORES.
 2. PRIMATES ... omnivorous 2. INSESSORES.
 3. GLIRES frugivorous 3. RASORES.
 4. UNGULATA ... frequenting the vicinity of water . 4. GRALLATORES.
 5. CETACEA aquatic 5. NATATORES."

(*Linn. Trans.* vol. xvi. p. 26.)

In the subjoined Plate some figures are given of the principal modifications of the locomotive and masticatory organs referred to in the preceding classifications.

Fig. 1. The lower extremity of Man.

Fig. 2. The corresponding extremity in the Ape.

Fig. 3. _____ Lion.

Fig. 4. _____ Rhinoceros.

Fig. 5. _____ Antelope.

Fig. 6. _____ Seal.

In the figures of the dentary organs or secondary characters, those animals have been selected of which descriptions have been given in this work.

Fig. 7. (from the Bear), shows the three kinds of teeth characteristic of the first two orders of the *Unguiculata*; the lines *a*, *b*, *c*, *d*, *e* are drawn respectively behind the *incisors*, *laniaries*, spurious, sectorious, and tuberculate *molaries*: this subdivision of the latter kind of teeth becoming necessary in the Carnivora, where their form is modified, as the terms indicate, for cutting as well as grinding. In the Quadrupeds they are of a more uniform structure.

The dental formula of the genus *Ursus* is as follows:—

Dent. prim. $\frac{6}{6}$, *lan.* $\frac{1.1}{1.1}$, *mol.* $\frac{6.6}{7.7}$.

Fig. 8. Fasciated Kangaroo.

Dental formula of the genus *Halmaturus*, Fr. Cuv.—*Dent. prim.* $\frac{6}{2}$, *lan.* $\frac{0}{0}$, *mol.* $\frac{5.5}{5.5}$.

Fig. 9. Canada Porcupine.

Dental formula of the genus *Synetheres*, Fr. Cuv.—*Dent. prim.* $\frac{2}{2}$, *mol.* $\frac{4.4}{4.4}$.

In this figure the jaws are turned so as to show the grinding surfaces of the molar teeth, and the manner in which the enamel is intermixed with the ivory of the tooth. The figures which the enamel thus forms vary in the different genera of *Rodentia*, but are always more or less transverse; and the structure of the joints of the jaw is such as to give the grinding motions a direction backwards and forwards.

Fig. 10. Weasel-headed Armadillo.

Dental formula of the genus *Dasypus*, Fr. Cuv.—*Dent. prim.* $\frac{2}{4}$, *lan.* $\frac{0}{0}$, *mol.* $\frac{8.8}{8.8}$.

Fig. 11. Asiatic Elephant.

Fig. 12. African Elephant.

Dental formula of the genus *Elephas*.—*Dent. prim.* $\frac{2}{0}$,
lan. $\frac{0}{0}$, *mol.* $\frac{2.2}{2.2}$, or $\frac{1.1}{1.1}$.

Fig. 13. Indian Rhinoceros.

Dent. prim. $\frac{4.4}{4.4}$, *mol.* $\frac{7.7}{7.7}$.

Fig. 14. The Giraffe.

Dent. prim. $\frac{0}{8}$, *mol.* $\frac{6.6}{6.6}$.

NEST OF THE TAILOR-BIRD.

To the Editor of the Zoological Magazine.

SIR,

Of all the various birds which show inimitable skill in the construction of their nests, the one I think which has occasioned the greatest wonder and admiration is the Tailor-bird of Hindostan. Although, perhaps, many other birds, which are so busily engaged in collecting little tufts of hair, disengaging them from each other, and then braiding them into the smooth lining of their mossy baskets, may really possess equal ingenuity, yet the tailor-bird excites more surprise, from his setting about his work more as a human creature might be expected to do. The account given by Dr. Darwin of this little bird, is, that he picks up a fallen leaf, and fastens it by means of his sharp bill, which answers the purpose of a needle, to another leaf growing on the slender branch of a tree, and then lines this purse-formed nest with down. This account has been copied by many writers, and receives some confirmation from the appearance of the nests which are preserved in the British Museum. But against this opinion we have the strong evidence of an eye-witness, Mr. Forbes, who says that he himself observed the actions of a pair of these birds in his garden in India, and who, while he confirms the fact of the bird sewing leaves together with cotton, says, that he does this, not to make a nest, but to *conceal* the nest which he has made. If we credit this last account in preference to Darwin's, what are we to think of the nests in the British Museum?

The author of the 'Architecture of Birds' thinks Mr. Forbes's statement the more probable. Why so? Is it not the sewing of the leaves which excites our surprise? And does the bird appear less extraordinary if he devotes his skill, not, as other birds do, to the important affair in hand, but to the *after-thought* of concealment?

The author of the 'Architecture of Birds' also states, on the authority of Latham and Edwards, that there is a bird in the West Indies (the Bonana Starling) which combines leaves and fibres in a most ingenious manner, and sews them "to the under part of a bonana leaf, so that the leaf makes one side of the nest."

It cannot surely be thought out of reason for a little bird in the East Indies to busy himself in pretty nearly the same manner as another bird does in the West. It is worthy of observation, that Darwin speaks of the tailor-bird, which he describes as a bright yellow bird, while Forbes describes him as possessing as gay plumage as that of the harlequin humming-bird: it is, perhaps, possible that Dr. Darwin's authority might have viewed the female only, or yellow may be the colour of the youthful jirkin, before the complete tailor-apparel is complete. But is it not also possible that there are two birds in the East Indies which construct their nests, the one *of leaves*, the other *amongst* them, both using the *needle*? and thus may not both accounts be true?

I am well aware that we should incline to the statements of the *ocular* observer, rather than to those of the theorist at home; but I do not like to give up the evidence of the nests themselves. Perhaps, Sir, you may be able to throw some light upon these ingenious architects. I shall be much gratified if these hasty observations of mine should be the means of leading to a further investigation of this curious fact. There are many Englishmen in India,—men of *leisure*, too,—but I fear there is no Alexander Wilson among them.

C. E.

London, May 3rd, 1833.

We are happy in being able to add to the observations of our Correspondent the testimony of an accurate and talented observer, relative to the interesting habits of the tailor-bird.

Colonel Sykes, whose zoological researches in India may well bear a comparison with those of the American ornithologist, states, that the species of tailor-bird (*Orthotomus Bennettii*) whose operations came under his observation, "constructed its nest by sewing the leaves of trees together with cotton thread and fibres;" and that he "has seen nests in which the thread used was literally knotted at the end." In this species the sexes are alike in plumage.—*Proceedings of Zoological Society*, vol. ii. p. 90.

INCUBATION OF THE EGGS OF THE COMMON FOWL BY AN EAGLE.

A CORRESPONDENT, to whom we are indebted for some useful suggestions, informs us, that "at the Chequers Inn, Uxbridge, Middlesex, may be seen an eagle which has hatched and brought up several broods of the common fowl."

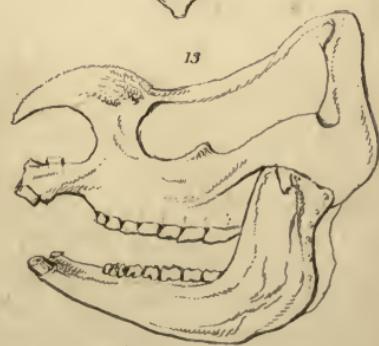
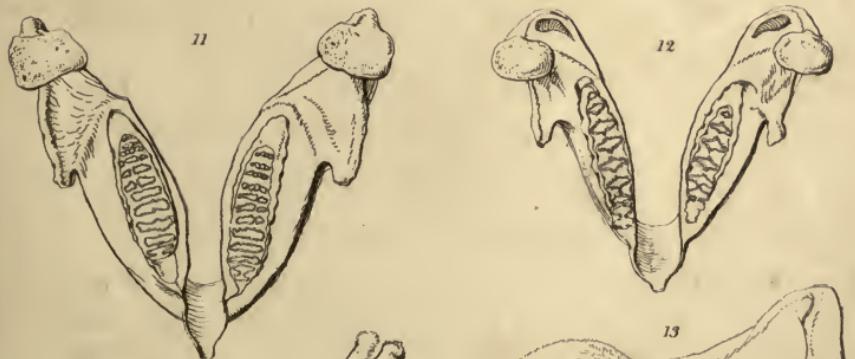
THE HIPPOCAMPUS.

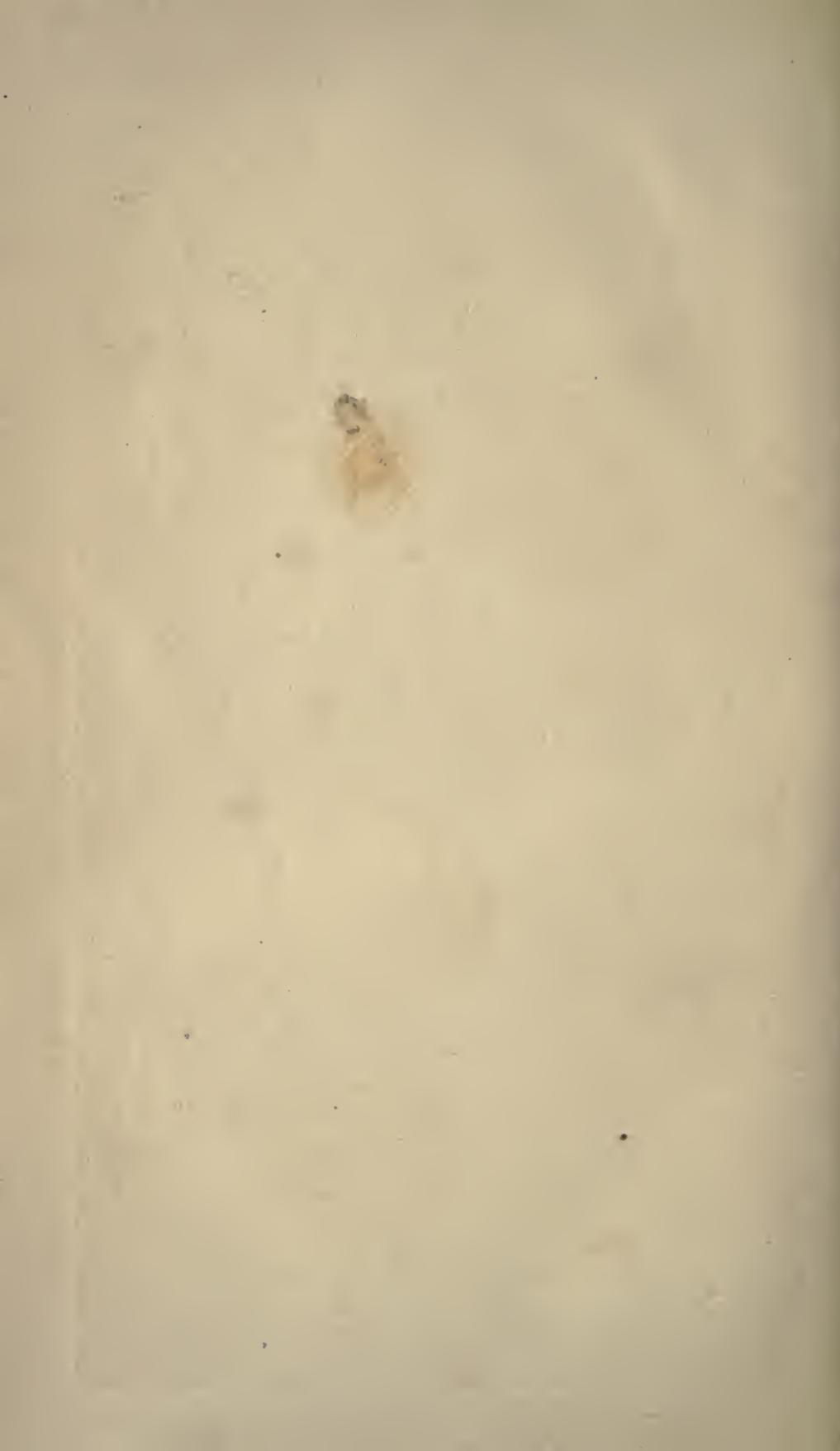
THE Sea-Horse, or Hippocampus, is a small fish belonging to the family *Syngnathidae*, and the Order called *Lophobranchii* by Cuvier; the few genera which constitute that Order differing from other fishes in the form of their gills, which are not disposed in the ordinary manner, like the teeth of a comb, but consist of small tufts arranged in pairs along the branchial arches. These fishes are also remarkable for having the body defended from one end to the other by a kind of armour, composed, for the most part, of quadrangular pieces. The genus *Hippocampus* differs from the *Syngnathi*, or Pipe-fishes, by its laterally compressed trunk, and the curvature of its tail, which generally takes place after death; but, like those fishes, the mouth is produced in a tubular form; and the female has a cavity, analogous to the marsupial pouch of the Opossum and Kangaroo, beneath the tail, in which the eggs are received and hatched. But little is known of the living habits of the *Hippocampi*, although a species (the *Hippocampus brevirostris*) is occasionally found on our own coasts.

THE ZOOLOGICAL GARDENS.

AT the Regent's Park may be seen a living specimen of one of the species of that rare bird, the Indian Hornbill; and naturalists have now an opportunity of witnessing the ease with which it uses its apparently disproportionate and cumbersome beak. Ornithologists have also the means of advantageously comparing together the four Struthious genera, *Dromaius*, *Cassuarius*, *Rhea*, and *Struthio*; these giants of their class being represented by fine and healthy specimens exhibited in different parts of the gardens.

Amongst the Mammalia we have not noticed any addition of consequence; but we were gratified on seeing the Brahmin cow and her calf in a healthy and promising condition.





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The Engraving of the Giraffe which was executed on wood, not answering our expectations, we have substituted one on steel, which we hope will give general satisfaction.

We intend, notwithstanding the expense, to adopt the latter style of engraving, whenever it will give a better representation of the Animal.

TO CORRESPONDENTS.

Thanks to Z—, R. S., W. C., and others, for their Letters and good wishes. The latter will see that we have availed ourselves of his communication.—We particularly invite similar contributions.

The article from Dulwich we fear will not suit our readers.

Owing to the length of the Descriptive Accounts in our present Number, we are obliged to postpone several extracts and translations, and a Memoir of Sir Joseph Banks.

** All communications for the Editor must be addressed (post paid) to the care of Messrs. Whittaker and Co., Ave Maria Lane.

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JOURNAL OF NATURAL HISTORY.



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TO CORRESPONDENTS.

W. C.'s further communication is received. We shall have an opportunity, shortly, of alluding to the subject, and of introducing his observations.

We are much indebted to I. C. C. for his valuable suggestions.

We also thank T. C. for his interesting communication, and shall be glad to hear again from him.

We feel obliged to H. M. R. of Reading for his letter.

Several letters have been received so late in the month that our Correspondents must excuse our noticing them at present.

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TO CORRESPONDENTS.

H. W.—F.Z.S.:—and other Communications, have been received, and we are obliged by the suggestions they contain.

We shall avail ourselves of J. W.'s notes on the Beaver when we treat of that animal.

We are under great obligations to E. E. for his valuable contributions. Several Communications are under consideration.

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W^m Clift.

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TO CORRESPONDENTS.

As we propose to give in a future number an abridged treatise on Taxidermy, or the art of preserving animals, we shall defer until then the reply to the question of 'Sphinx' as to 'the best and speediest method of destroying the lives of moths and other well-clothed insects' without injury to their fine down or barbed scales.

To A. Z. Wolverhampton. We fear the additional matter he wishes for would extend our work beyond the plan originally proposed, and oblige us to increase its price.

T. M., Castle Hill, will find in Pennant's British Zoology, vol. i. p. 79, first edition, a brief account of the early introduction of exotic quadrupeds, and of the establishment of menageries in this country.

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